Appendix G

BIOLOGICAL RESOURCES TECHNICAL REPORT
SILVER STATE SOLAR SOUTH
CLARK COUNTY, NEVADA

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SUMMARY

Silver State Solar Power South, LLC has requested a right-of-way grant from the Bureau of Land Management (BLM) to construct and operate a new solar photovoltaic energy generating facility in Clark County, Nevada, northeast of Primm (Stateline), Clark County, Nevada. The Silver State Project consists of two sites: Silver State North and Silver State Solar South. Silver State North was constructed in 2011 and was substantially complete in March 2012. Silver State Solar South is in the process of final design and permitting. This technical report provides information on biological resources found within the study area for Silver State South.

This report provides a comprehensive description of methods and results of biological resource surveys and investigations conducted between April and May 2011 within the Study Area. In addition, results of surveys conducted in 2008 and 2009 and clearance data reported from the Silver State North project are included. The purpose of the surveys was to provide information supporting consultation between BLM and U.S. Fish and Wildlife Service (FWS), with respect to the Federal Endangered Species Act and National Environmental Policy Act (NEPA).

Focused surveys for desert tortoise (*Gopherus agassizii*), a federally listed (Threatened) and State-protected species and focused surveys for special status plant species were conducted in spring of 2011. All incidental wildlife and plant species, including other special status species, observed during the surveys were recorded. Previous sampling was conducted for desert tortoise in 2008 and 2009. Based on the U.S. Fish and Wildlife Service (USFWS) density formulas, the Study Area was estimated to support adult desert tortoise densities ranging from six to nineteen tortoises per square mile (point estimate). The Study Area is located outside the boundaries of an Area of Critical Environmental Concern, Desert Wildlife Management Area, Wilderness Area, or designated Critical Habitat Unit.

Other special status wildlife species that were observed within the Study Area include: golden eagle (*Aquila chrysaetos*), burrowing owl (*Athene cunicularia*), prairie falcon (*Falco mexicanus*), loggerhead shrike (*Lanius ludovicianus*), Brewer's sparrow (*Spizella breweri*), crissal thrasher (*Toxostoma crissale*), LeConte's thrasher (*Toxostoma lecontei*), and desert kit fox (*Vulpes macrotis*).

Focused botanical surveys resulted in the documentation of three special status plant species including Death Valley ephedra (*Ephedra funerea*), white margined beardtongue (*Penstemon albomarginata*), and yellow two-toned beardtongue (*Penestemon bicolor ssp bicolor).* More than 150 species of plants were identified during the surveys. No Federal- or State-listed (endangered or threatened) plant species were observed.

1.0 INTRODUCTION

1.1 Purpose

This Biological Resources Technical Report (BRTR) provides a comprehensive description of methods and results of focused desert tortoise and special status plant surveys conducted in 2011 within the Study Area for Silver State Solar South (Project) as proposed by Silver State Solar Power South, LLC. Results of biological surveys conducted in previous years are also summarized in this report. The purpose of these surveys was to determine the presence or absence of desert tortoise, special status plants, and other special status species. The information presented in this report provides a basis for determining potential impacts on special status species and potential need for further coordination between Bureau of Land Management (BLM), U.S. Fish and Wildlife Service (USFWS), Nevada Department of Wildlife (NDOW), and Clark County. The data contained within this report also provides information to comply with requirements of the National Environmental Policy Act (NEPA).

1.2 Site Location

The site is located in unincorporated Clark County, Nevada near the boundary of California and Nevada, less than one mile east of the town of Primm (Stateline) (Figure 1). The site is located east of Interstate 15 and Roach Lake and can be found on the Desert and Roach 7.5-Minute U.S. Geological Survey topographic quadrangles. The site is located outside the boundaries of an Area of Critical Environmental Concern (ACEC), Desert Wildlife Management Area (DWMA), Wilderness Area, or USFWS designated critical habitat unit (CHU) for desert tortoise. The site is located one mile north of the Ivanpah Valley DWMA/ACEC and 9.5 miles west of the South McCullough Wilderness Area (Figure 2). The site is also located 3.8 miles north of the Ivanpah CHU and seven miles west of the Piute-Eldorado CHU.

1.3 Site Characteristics

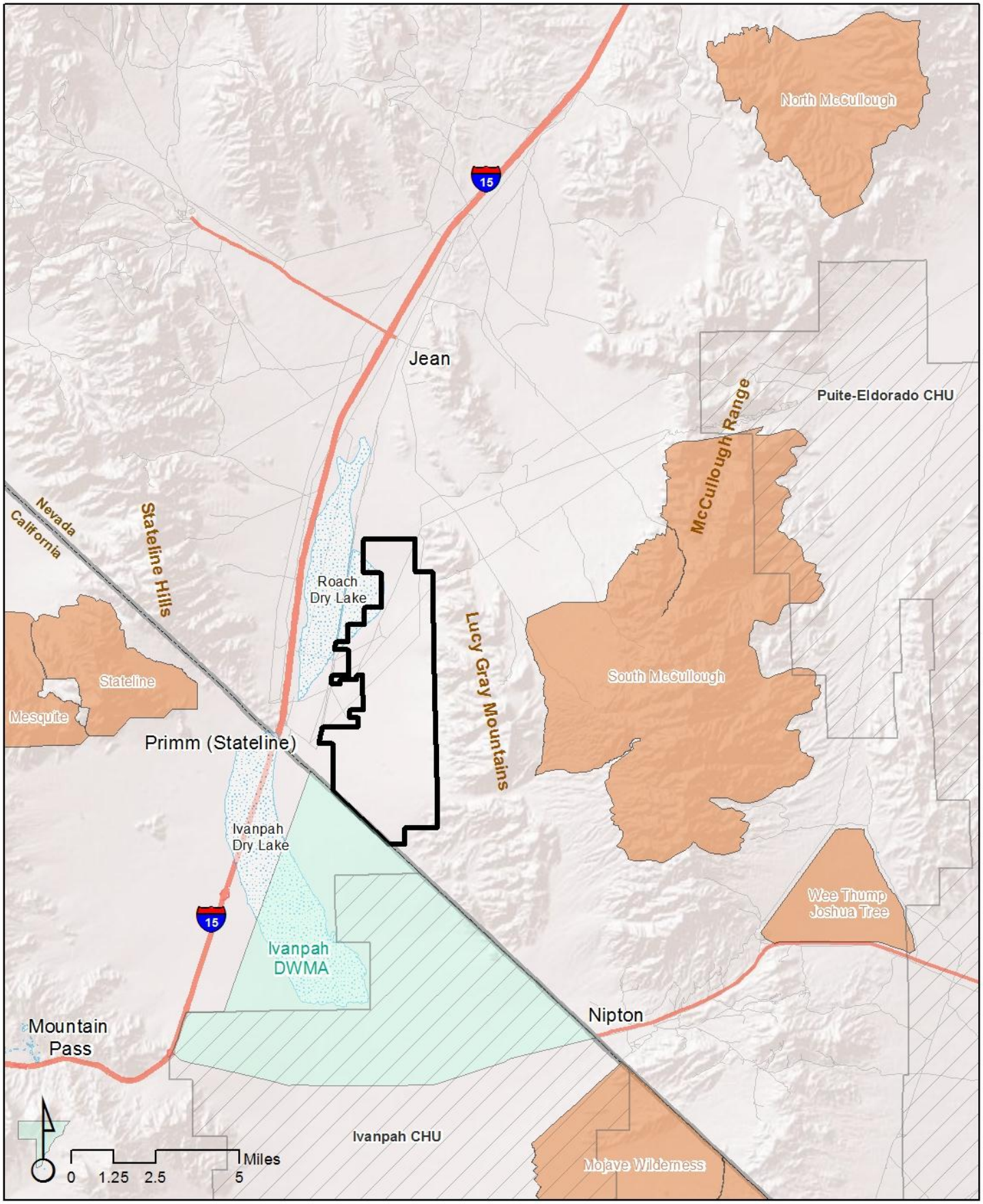
Soils on the site vary from sand to gravel to rock within a broad alluvial fan originating in the Lucy Gray Mountains. Elevation at the site ranges from approximately 2,600 to 3,500 feet above mean sea level (amsl). Slopes within the site range from approximately 0 to 5 percent with a general west-facing aspect. Human disturbances within the site include moderate levels of off-highway vehicle (OHV) activity, existing utility corridors (i.e., overhead power transmission lines and underground petroleum pipeline) and associated access roads.

1.4 Study Area

For the purpose of this report, the Study Area is defined by the area of land subject to biological resource surveys and which falls within Silver State Solar Power South, LLC's Right-of-Way (ROW) application boundary filed in the current Plan of Development (POD). The Study Area is considerably larger than the area proposed for site design. Figure 3 provides the boundaries of Biological Resource Study Area, which equaled approximately 13,309 acres.

Silver State Solar South

Figure 1
Regional Setting



Study Area

Desert Tortoise Critical Habitat

BLM Area of Environmental Concern

Wilderness Area

Silver State Solar South

Figure 2
Study Area

1.5 Regulatory Framework

This report provides information regarding biological resources regulated by several local, State and Federal laws including, but not limited to, the following environmental policies.

Endangered Species Act

The Endangered Species Act (ESA) was passed by the U.S. Congress in 1973 and provides for the protection of threatened and endangered plants and animals and their critical habitat. The U.S. Fish and Wildlife Service (USFWS) is the responsible federal agency for implementing the ESA for all terrestrial species. Consultation with the USFWS is performed though Section 10 (no federal nexus) or Section 7 (federal agency involved).

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) prohibits the "take" (i.e., killing, harassing, trapping, or attempting to do so) of native migratory bird species. The MBTA makes it unlawful to pursue, hunt, take, capture, kill, or sell birds listed under the MBTA. The statute does not discriminate between live or dead birds, and grants full protection to any bird parts, including feathers, eggs, and nests.

Bald and Golden Eagle Protection Act

Bald and Golden Eagle Protection Act prohibits any form of possession or taking of both bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*). Under current regulations, limited take through disturbance or mortality may be authorized for otherwise lawful activities.

BLM Cacti and Yucca Salvaging Guidelines

The BLM typically requires transplanting and salvage of native plant species that would otherwise be affected by development on their lands (BLM 2001). Species of cacti, yucca, and ocotillo are usually considered for transplanting and salvage.

Invasive Plants and Noxious Weeds

The BLM manages invasive plant species and noxious weeds through coordination with the National Invasive Species Council and State of Nevada. The BLM defines noxious weeds as "a plant that interferes with management objectives for a given area of land at a given point in time." State of Nevada defines noxious weeds as "any species of plant which is, or liable to be, detrimental or destructive and difficult to control or eradicate [Nevada Revised Statute (NRS) 555.005]." The BLM Las Vegas Office has committed to focusing on the Nevada state list of noxious weeds, as these species are recognized for having major impacts on ecosystem health and natural resources (BLM 2006). The Nevada Department of Agriculture maintains the list of noxious weeds and has developed a rating system that reflects the statewide importance of the noxious weed, the likelihood that eradication or control efforts would be successful, and the present distribution of noxious weeds within Nevada.

Nevada Revised Statute 501

NRS 501, which is supplemented by the Nevada Administrative Code (NAC), is the Nevada state law that covers administration and enforcement of wildlife resources within the state. NDOW is the state agency responsible for implementation of NRS 501, including the designation of protected species and issuance of authorizations for impacts to protected species. Species designations are maintained by the Nevada Natural Heritage Program, Department of Conservation and Natural Resources.

Nevada Revised Statute 527

NRS 527.060–527.120, supplemented by the NAC, protects and regulates the removal of Christmas trees, yuccas, and cacti for commercial purposes. Such removal or possession requires a permit and tags from the Nevada Spur Forester Fire Warden, Nevada Division of Forestry.

Clark County Multiple Species Habitat Conservation Plan (MSHCP)

The Clark County MSHCP and associated Environmental Impact Statement (EIS) were developed by its applicants (Clark County; the Cities of Las Vegas, North Las Vegas, Boulder City, Mesquite, and Henderson; and the Nevada Department of Transportation) in November 2000 (CCDCP 2000). The primary objectives of the MSHCP are to allow the incidental take of Covered Species (including ESA listed species), streamline incidental take permitting process for applicants and regulators, and ensure conservation of Covered Species within Clark County.

2.0 METHODS

2.1 Special Status Species Definition

For assessment purposes in this report, a special status species has been defined as a plant or wildlife species that meets the following criteria:

- designated as threatened or endangered by the U.S. Fish and Wildlife Service (USFWS) and is protected under the Federal Endangered Species Act (FESA);
- candidate species being considered or proposed for listing under FESA;
- protected under Nevada Revised Statutes and Nevada Administrative Code Sections 501, 503 and 527; and/or
- designated sensitive by the Bureau of Land Management (BLM 1996).

2.2 Literature Search

Prior to conducting the focused surveys, a biological resources literature search was performed. This included referencing relevant lists and publications from the BLM, USFWS, and Nevada Natural Heritage Program (NNHP), as well as researching information from regional documents such as the Clark County Multiple Species Habitat Conservation Plan (MSHCP). Biological reports prepared on behalf of other projects within the region were reviewed for relevant information.

2.3 Focused Desert Tortoise Surveys/Sampling

In October 20-31, 2008 and August 26-28, 2009, desert tortoise surveys were conducted using a modified TRED methodology (Sundance 2009). The USFWS and the BLM were consulted prior to initiating desert tortoise surveys in October 2008, and TRED sampling methodology was determined to be an acceptable method in estimating desert tortoise densities. TRED sampling was performed again in 2009 within additional sections within the Study Area. A total of 52 transects were conducted over approximately fifteen square miles associated with Alternative C [Alternative 2 of the FEIS (BLM 2010)]. Each transect was 1.5 miles in length and covered and area of 10 meters wide. Clearance surveys were also conducted on the Silver State North project site in spring of 2011. Clearance surveys were conducted utilizing the current USFWS protocols and in accordance with the Biological Opinion for the Silver State Solar Project (USFWS 2010a).

Full-coverage desert tortoise surveys were conducted between April 4 and May 27, 2011, following the USFWS revised survey protocol (USFWS 2010b). The full coverage survey option described in the revised protocols was unchanged from the previous protocol (USFWS 1992). The revised protocol also provided methods to estimate the abundance of tortoises occurring within the action area. Full-coverage survey transects were spaced ten meters apart. All tortoise sign (e.g., live tortoises, shell/bone/scutes, scats, burrows/pallets, tracks, egg shell fragments, and courtship rings) were recorded (Table 1). The location of all tortoise sign was recorded on a Garmin Global Positioning System (GPS) unit (GPS 72, 76, or 60CSx) using a unique identification code. The code included a two-character acronym for the type of sign (e.g., TO-live tortoise, BU-burrow, SC-scat), two-character initials for the lead surveyor of the crew, and a unique sequential

number. In addition to recording sign with the GPS unit, standardized paper datasheets were completed. All data was entered from these data sheets into a Microsoft Excel spreadsheet and incorporated into Geographical Information Systems (GIS) for spatial representation of the distribution of desert tortoise sign.

Table 1 - Desert Tortoise Data Recorded

Type of Sign	Measurements	Estimates	Other
Live tortoise		Sex, age class	Location, activity
Cover site (burrow, pallet)	Width, height	Depth	Condition (active [excellent], inactive [good, fair, or poor]) and location. Each burrow was investigated by using a handheld mirror and/or flashlight to detect if a tortoise was present
Scat	Quantity	Age class	Condition (this year or not this year), location
Shell or bone (carcass or fragments)		Sex, age class, time since death	Location
Tracks		Age	Location
Eggs or fragments		# of eggs	Condition, location
Courtship rings		Width	Location

2.4 Botanical Survey

The purpose of the botanical survey was to provide information on targeted special status plants and existing vegetation communities. Surveys were performed to maximize the likelihood of locating special status plant species within the Study Area. The primary objective was to identify all plant species within the Study Area to the taxonomic level (i.e., species, subspecies, or variety) necessary to determine rarity status. The botanical study followed the guidelines set forth in *Survey Protocols Required for NEPA/ESA Compliance for BLM Special Status Plant Species* (BLM 2009). The BLM Las Vegas Office was contacted to obtain further details regarding targeted plants species (Edwards 2011).

The botanical survey coincided with the primary blooming period for targeted special status species and was performed during several separate field efforts during April and May, 2011. The survey team included personnel familiar with the identification of flora in the Mojave Desert of Southern Nevada and consisted of highly qualified botanists: Kent Hughes, Glenn Rink, Marc Baker, Tim Thomas, Michael Honer, Steve Till, Corey Mitchell, Lehong Chow, and Brian Sandstrom. Information on potential special status species was reviewed by the survey team to obtain an effective search image. Records of all plant species observed were maintained daily. A checklist was developed based on previous surveys and reviewed during each subsequent day of survey. For the majority of the Study Area, survey methodology followed the intuitive controlled survey method, which is suitable for large survey areas and highly skilled investigators (BLM 2009). The field botanists conducted meandering pedestrian transects throughout the entire Study Area. Tighter transects spaced between 10 and 15 meters apart were conducted in habitats with the highest potential for supporting the target species.

Additional survey coverage was attained through collecting data on targeted special status plant species during the full coverage tortoise surveys. Crews were trained in the identification of target species. All observations were recorded on standardized datasheets. Each crew included at least one experienced desert botanist. Additional time was spent (in the field and after the day's survey) keying plant taxonomy. If a plant of unknown identification was found, a GPS record was taken and a unique identification number was assigned so that if after proper identification, it was determined to be a special status species, the population could be revisited to collect additional data. All data were incorporated into GIS.

2.5 Additional Special Status Wildlife Species

In addition to recording desert tortoise and special status plant species, surveyors recorded all wildlife species, regardless of status, that were encountered during the survey. All special status species recorded as incidental data were also recorded by GPS and assigned a unique identifier. All other species were tallied at the end of each transect and recorded throughout each day by each crew. All data were entered from these datasheets and were incorporated into GIS.

2.6 Rainfall Analysis

Measurements of total and average precipitation during winter periods (October through March) are important in determining the efficacy of both desert tortoise and special status plant surveys. Per the USFWS desert tortoise protocol, data was obtained from the Western Regional Climate Center (2011). The Mountain Pass Cooperative Observer Program (COOP) weather station (elevation above 4,700ft and approximately 15 miles southwest of the Study Area) is the most proximate station to the Study Area; however, rainfall data is not available after 1997. Subsequently, monthly precipitation totals were obtained from the two next closest weather stations providing current data: Horse Thief Springs California Remote Automated Weather Stations (RAWS) (elevation 5,000ft and approximately 25 miles northwest of the Study Area) and Mid Hills California RAWS (elevation 5,413ft and approximately 30 miles south of the Study Area). These stations occur at elevations approximately 2,000 feet greater than the Study Area, which may not be ideal for use as surrogate sites. The next closest weather station is located in Searchlight, Nevada (elevation 3,540ft and approximately 30 miles southeast of the Study Area). Although the Searchlight station is slightly further from the Study Area, it is located at a similar elevation.

Rainfall data derived from the Searchlight and Mountain Pass stations were utilized in a previous desert tortoise study within the greater Ivanpah Valley, which indicated a long term average of total winter rainfall between 1961 and 1996 of 4.1 inches (Christopher et. al 1999). Available historical winter rainfall data from Searchlight and Mountain Pass was summarized to obtain a useful average for the Study Area (Table 2).

Table 2 - Historical Winter Rainfall Data[1] (inches)

	October	November	December	January	February	March	Total	Monthly Average
Searchlight[2]	0.94	0.97	0.78	0.52	0.43	0.80	4.44	0.74
Mountain Pass[3]	0.54	0.68	0.63	0.92	0.89	0.89	4.55	0.76
Mean	0.74	0.83	0.71	0.72	0.66	0.85	4.50	0.75

[1] Western Regional Climate Center (2011)
[2] Range of data from 1931 to 2011
[3] Range of data from 1955 to 1997

Due to the absence of rainfall data for the Mountain Pass station since 1997, data obtained from the Horse Thief Wash and Mid Hills stations were used as a surrogate for recent year averages. Total winter rainfall data from Searchlight, Horse Thief Wash, and Mid Hills from the previous six winter periods were tabulated separately, provided in Appendix A, and were then averaged (Table 3).

Table 3 - Recent Winter Rainfall Data[1] (inches)

	October	November	December	January	February	March	Total	Monthly Average
2005-2006	1.79	0.00	0.03	0.24	0.42	1.44	3.92	0.65
2006-2007	1.08	0.32	0.58	0.91	0.67	0.02	3.58	0.60
2007-2008	0.25	0.63	1.01	1.06	0.50	0.09	3.53	0.59
2008-2009	0.02	0.91	0.85	0.14	1.59	0.03	3.53	0.59
2009-2010	0.00	0.06	1.12	2.80	1.91	0.36	6.25	1.04
2010-2011	1.67	0.27	7.45	0.05	1.29	0.50	11.23	1.87

[1] Western Regional Climate Center (2011): Searchlight, Mid Hills, and Horse Thief Wash Stations

The historical average rainfall for the Study Area during the winter months was estimated to be 0.75 inches. By comparison, below-average winter rainfall occurred from 2005 to 2009. This four-year period was characterized by gradually decreasing rainfall for each subsequent year. Winter rainfall was above average from 2009 to 2011, with the highest amount of rainfall occurring during the most-recent winter of 2010-2011.

3.0 RESULTS

3.1 Vegetation Communities

The Study Area supports three vegetation alliances that are based on the Nevada Natural Heritage Program classification: *Larrea tridentata-Ambrosia dumosa* Shrubland, *Yucca schidigera-Larrea tridentata-Ambrosia dumosa* Shrubland, and *Atriplex polycarpa* Shrubland (Figure 3). Representative site photographs are found in Appendix A. Over 150 species of plants were identified within Study Area during the surveys (Appendix B).

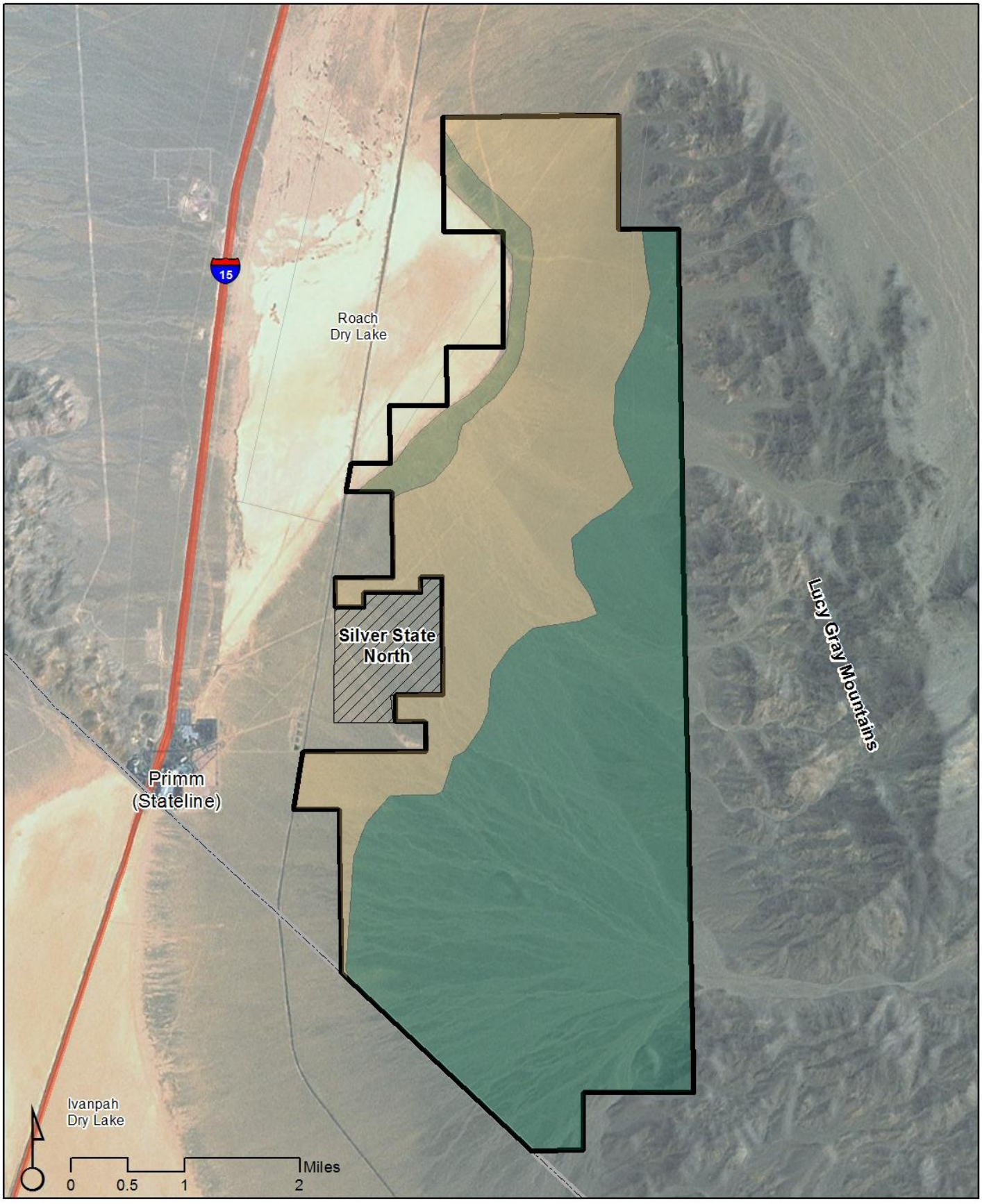
Larrea tridentata-Ambrosia dumosa Shrubland is dominated by creosote bush (*Larrea tridentata*) and burro brush (*Ambrosia dumosa).* This alliance is most prevalent within the Study Area and primarily occurs in the mid-elevation range. Additional plant species characteristic of these alliances include Death Valley ephedra (*Ephedra funerea*), littleleaf ratany (*Krameria erecta*), California buckwheat (*Eriogonum fasciculatum*), beavertail cactus (*Cylindropuntia basilaris*), and golden cholla (*Cylindropuntia echinocarpa*). Common herbaceous species include desert chicory (*Rafinesquia neomexicana*), combseed (*Pectocarya platycarpa*), rigid spineflower (*Chorizanthe rigida*), cryptantha (*Cryptantha* spp.), sun cup (*Camissonia* spp.), and desert pincushion (*Chaenactis fremontii*).

Yucca schidigera-Larrea tridentata-Ambrosia dumosa Shrubland is dominated by creosote bush, burro brush and Mojave yucca (*Yucca schidigera*). This alliance occurs higher in the alluvial fan within soils that contain higher proportion of gravel and rocks. Plant diversity and cacti/yucca density is higher in these regions as compared to the *Larrea tridentata-Ambrosia dumosa* Shrubland alliance.

Atriplex polycarpa Shrubland occurs at the lowest elevation range within the Study Area along the edges of Roach Lake where soils are relatively fine. This alliance is dominated by allscale (Atriplex polycarpa) and contains other shrubs including creosote bush, burro brush and big galleta (*Pleuraphis rigida).*

3.2 Wildlife Species

All wildlife species observed or detected within the Study Area are listed in Appendix C. Wildlife observed within the Study Area were representative of the northeastern Mojave Desert. Thirty-five bird species were detected within the Study Area. Bird species relatively common to the Study Area, listed in order of most-to-least frequently observed during the surveys, included black-throated sparrow (*Amphispiza bilineata*), horned lark (*Eremophila alpestris*), ash-throated flycatcher (*Myiarchus cinerascens*), common raven (*Corvus corax*), common poorwill (*Phalaenoptilus nuttallii),* cactus wren (*Campylorhynchus brunneicapillus*), and lesser nighthawk (*Chordeiles acutipennis*). Thirteen species of reptiles were detected within the Study Area.



Silver State Solar South

Study Area

Atriplex polycarpa Shrubland

Larrea tridentata-Ambrosia dumosa Shrubland

Yucca schidigera-Larrea tridentata-Ambrosia dumosa Shrubland

Figure 3
Vegetation Alliances

Reptile species relatively common to the Study Area, listed in order of most-to-least frequently observed during the surveys, included western whiptail (*Cnemidophorus tigris*), side-blotched lizard (*Uta stansburiana*), zebra-tailed lizard (*Callisaurus draconoides*), long-nosed leopard lizard (*Gambelia wislizenii*), desert iguana (*Dipsosaurus dorsalis*), and desert horned lizard (*Phrynosoma platyrhinos*), and coachwhip (*Masticophis flagellum*). Six species of mammals were detected within the Study Area. Mammal species relatively common to the Study Area, listed in order of most-to-least frequently observed during the surveys, included black-tailed jackrabbit (*Lepus californicus*), antelope ground squirrel (*Ammospermophilus leucurus*), and desert woodrat (Neotoma lepida). Small mammals (*Dipodomys* spp., *Chaetodipus* spp., and *Perognathus* spp.) likely inhabit the Study Area, although focused trapping was not conducted. No fish or amphibian species are likely to inhabit the Study Area or immediately surrounding areas because of the absence of suitable aquatic habitat.

3.3 Special Status Plant Species

Thirteen special status species were reviewed for their potential to occur within the Study Area (Table 4). Correspondence was made with the BLM Las Vegas Office regarding target special status species near the Study Area (Edwards 2011). None of the species are federal-listed (endangered or threatened), but all are considered special status by the BLM, NNHP, and/or State of Nevada. Descriptions of species occurring within the Study Area follow the table. A list of all common and special-status plant species observed during the surveys is found in Appendix B.

Table 4 - Special Status Plants Species

Common Name ***Scientific Name***	**Status**		**Habitat**	**Flower Period**	**Survey Results**
Arctomecon merriami white bearpoppy	FWS: BLM: State: NNHP: MSHCP:	none sensitive none S3 covered	Desert saltbush scrub and Mojave desert scrub. Limestone and dolomite soils; on ridges, rocky slopes, gravelly canyon washes. 2,000 to 6,200 feet.	Apr - Jun	**Not Found**
Arctomecon californica Las Vegas bearpoppy	FWS: BLM: State: NNHP: MSHCP:	none sensitive CE S3 covered	Mojave desert scrub and Desert saltbush scrub on gypsum soils. 1,300 to 2,700 feet.	Apr - May	**Not Found**
Astragalus nyensis Nye milk-vetch	FWS: BLM: State: NNHP: MSHCP:	none none none S3 not covered	Mojave desert scrub. Foothills of desert mountains on calcareous outwash fans and gravelly flats. 1,100 to 5,600 feet.	Apr - May	**Not Found**
Astragalus mahavensis var. mohavensis Mohave milk-vetch	FWS: BLM: State: NNHP: MSHCP:	none none none S2S3 not covered	Mojave desert scrub. Dry rocky often limestone substrates. 2,640 to 5,577 feet.	Feb - Jun	**Not Found**

Common Name ***Scientific Name***	**Status**		**Habitat**	**Flower Period**	**Survey Results**
Astragalus remotus Spring Mountains milkvetch	FWS: BLM: State: NNHP: MSHCP:	none sensitive none S2 covered	Mojave desert scrub. Rocky, gravelly, and/or sandy calcareous soils. 3,400 to 7,050 feet.	Apr - May	**Not Found**
Cryptantha tumulosa New York Mountains catseye	FWS: BLM: State: NNHP: MSHCP:	none none none S2 watch list	Mojave desert scrub and pinyon and juniper woodland. Granitic/ carbonate gravelly or clay substrates. 3,000 to 9,990 feet.	Apr - Jul	**Not Found**
Ephedra funerea Death Valley ephedra	FWS: BLM: State: NNHP: MSHCP:	none none none watch list not covered	Mojave desert scrub. Sandy, dry soil and rocky soils. 1,640 to 4,920 feet.	Mar - Apr	**Present** Widespread through mid-high elevations in sandy and rocky soils.
Eriogonum heermannii var. clokeyi Clokey buchwheat	FWS: BLM: State: NNHP: MSHCP:	none sensitive none S2 evaluated	Mojave desert scrub, shadscale, and blackbrush. Carbonate outcrops, talus, scree slopes, and gravelly washes. 4,000 to 6,000 feet.	Jun - Sept	**Not Found**
Littlefield [Astragalus] preussii var. *laxiflorus* Littlefield milkvetch	FWS: BLM: State: NNHP: MSHCP:	none none none S1S2 none	Chenopod scrub with dune or deep sand habitats.	Mar - May	**Not Found**
Penstemon albomarginatus White-margined beardtongue	FWS: BLM: State: NNHP: MSHCP:	none sensitive none S2 covered	Mojave desert scrub, blackbrush, and stabilized dunes with sandy soils. 2,100 to 5,890 feet.	Mar - May	**Present** Northern extent of Study Area within sandy soils.
Penstemon bicolor ssp. *bicolor* yellow two-toned beardtongue	FWS: BLM: State: NNHP: MSHCP:	none sensitive none S2 covered	Creosote-bursage, blackbrush, and mixed scrub. Calcareous or carbonate soils in washes, roadsides, rock crevices, outcrops. 2,500 to 5,480 feet.	Apr - Jun	**Present** Southeastern extent of Study Area within wash system.
Penstemon bicolor ssp. *roseus* rosy twotone beardtongue	FWS: BLM: State: NNHP: MSHCP:	none sensitive none S3 none	Creosote-bursage, blackbrush, and mixed scrub communities. Rocky calcareous, granitic, or volcanic soils. 1,800 to 4,839 feet.	Mar - Sept	**Not Found**
Phacelia analesonii Aven Nelson phacelia	FWS: BLM: State: NNHP: MSHCP:	none none none watch list not covered	Joshua tree woodland and pinyon and juniper woodland. 3,940 to 5,020 feet.	Apr - May	**Not Found**

FWS - U.S. Fish and Wildlife Service
NNHP - Nevada Natural Heritage Program
MSHCP – Clark County Multiple Species Habitat Conservation Plan

Nevada State Protected Classification
CE - critically endangered

NNHP State Ranks for Threats and Vulnerability
S1 – critically imperiled and especially vulnerable to extinction or extirpation due to extreme rarity, imminent threats or other factors
S2 - imperiled due to rarity or other demonstrable factors
S3 - vulnerable to decline because of rare and local throughout its range, or with very restricted range

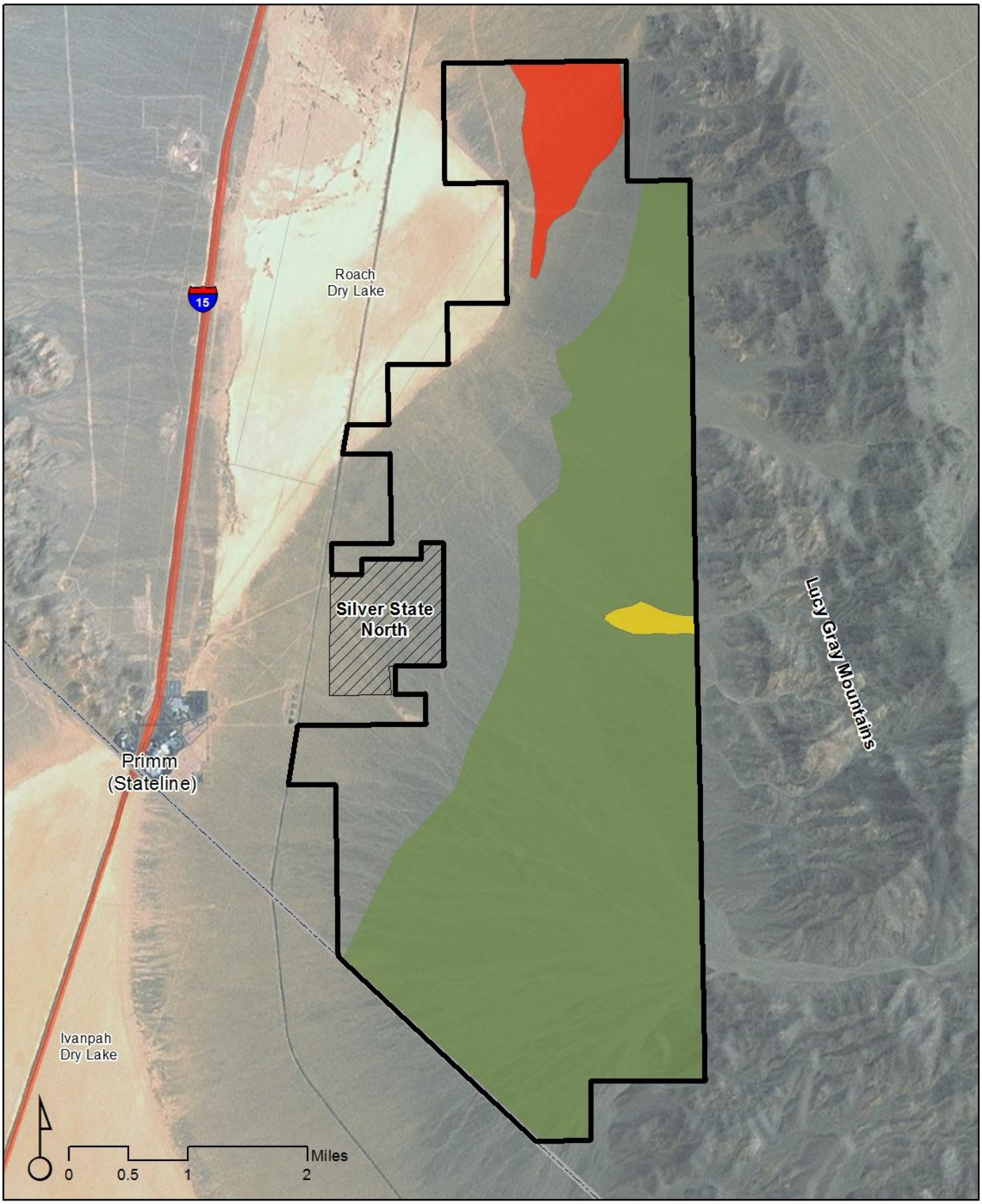
Death Valley ephedra (*Ephedra funerea*) is a Nevada Special Watch List Species. This species is a perennial shrub typically occurring in sandy and/or rocky soils within desert scrub communities at elevations ranging from 1,640 to 4,920 feet amsl. The range of this species primarily occurs in California and to a lesser extent in Nevada. Death Valley ephedra was widespread within the Study Area and was the most common *Ephedra* sp. present during the surveys. Due to the large size of the Study Area and the abundance of this species, individual plants were not recorded and it is estimated that thousands of individual plants occur within the 9,930-acre Study Area (Figure 4).

White-margined beardtongue (*Penstemon albomarginatus*) is a Nevada Special Status Species and designated Sensitive by the BLM State Office. This species is ranked by the NNHP as being imperiled due to rarity. White-margined beardtongue is a perennial herb that is historically known to occur in Mojave Desert scrub, and less frequently in blackbrush scrub, on sand bottoms of outwash canyons and the leeward side of lake beds at elevations ranging from 1,500 feet to 3,500 feet amsl. This species is dependent on sand transport systems from dry lakebeds towards lower slopes. It is endemic to the eastern Mojave Desert and has been recorded in Hidden Valley, Jean Lake, and Roach Lake. White-margined beardtongue was detected within the northern extent of the Study Area. It occurred within sandy soils associated with the washes that wrap around the northern tip of the Lucy Gray Mountains (Figure 4). This species was also found within the northern edges of Roach Lake. Over 1,700 individual plants were recorded.

Yellow two-toned beardtongue (*Penstemon bicolor* ssp. *bicolor*) is a Nevada Special Status Species and designated Sensitive by the BLM State Office. This species is ranked by the NNHP as being imperiled due to rarity. This species is an herbaceous short-lived perennial known to occur in creosote-bursage, blackbrush, and mixed scrub communities on calcareous or carbonate soils; typically found in active gravel washes, rock crevices, and outcrops at elevations from 2,500 feet to 5,500 feet amsl. Yellow two-tone beardtongue is endemic to southern Nevada and known to occur in lower elevations of the Spring Mountains and the McCullough Range. This species was found within the southeastern extent of the Study Area within a broad wash system (Figure 4).

3.4 Cacti and Yucca

Cacti and yucca, as well as evergreen trees, are protected and regulated by BLM and Nevada policy. These regulations cover the removal or possession at commercial rates of cacti, yucca, and evergreen trees. Cactus and yucca were relatively denser within upper elevations of the alluvial fan in areas supporting *Yucca schidigera-Larrea tridentata-Ambrosia dumosa* Shrubland (Figure 3). Due to the large size of the Study Area, individual counts of these species were not obtained. The relative abundance of cacti and yucca is provided (Table 5).



Approximate Distribution (2011)

- White-margined beardtongue (Penstemon albomarginatus)
- Yellow twotone beardtongue (Penstemon bicolor ssp. bicolor)
- Death Valley ephedra (Ephedra funerea)

Study Area

Silver State Solar South

Figure 4
Special Status Plants

Table 5 - Cacti and Yucca Abundance

Scientific Name	Common Name	Relative Abundance
Cylindropuntia acanthocarpa var. *coloradensis*	buckhorn cholla	low to high[1]
Opuntia basilaris ssp. *basilaris*	beavertail	Low
Cylindropuntia echinocarpa	golden cholla	low to high[1]
Cylindropuntia ramossisima	pencil cholla	Low
Echinocactus polycephalus	cottontop	Low
Echinocereus engelmanii	calico cactus	Low
Ferocactus cylindraceus var. *cylindraceus*	barrel cactus	low to high[1]
Grusonia parishii	matted cholla	Low
Mammillaria tetrancistra	Common fishhook cactus	Low
Opuntia erinacea var. *erinacea*	Mojave pricklypear	very low
Yucca schidigera	Mojave yucca	low to high[1]

[1] Abundance correlated with elevation within the alluvial fan with lower densities at low elevations and higher densities within upper elevations.

3.5 Invasive Plant Species

One invasive plant species designated by the Nevada Department of Agriculture as a Category B weed species was found within the Study Area: Sahara Mustard (*Brassica tournefortii*). Category B species are defined as "weeds established in scattered populations in some counties of the state; actively excluded where possible, actively eradicated from nursery stock dealer premises; control required by the state in areas where populations are not well established or previously unknown to occur." Other invasive species found within the Study Area included Mediterranean grass (*Schismus barbatus*), cheat grass (*Bromus tectorum*), red brome (*Bromus madritensis* ssp. *rubens*), Russian thistle (*Salsola tragus*), and salt cedar (*Tamarisk* sp.). Many of these species are recognized for their widespread distribution and are typically not considered to be feasibly controlled on a large scale.

3.6 Special Status Wildlife Species

Fourteen special status wildlife species were evaluated for their potential to occur (Table 6). One wildlife species that is Federal-listed (Threatened) and State-protected occurs within the Study Area: the desert tortoise. Seven additional special status wildlife species were detected within the Study Area: burrowing owl (*Athene cunicularia*), prairie falcon (*Falco mexicanus*), loggerhead shrike (*Lanius ludovicianus*), Brewer's sparrow (*Spizella breweri*), crissal thrasher (*Toxostoma crissale*), LeConte's thrasher (*Toxostoma lecontei*), and desert kit fox (*Vulpes macrotis*). Special status species that were detected within the Study Area are shown in Table 6 and discussed further in this section.

Table 6 - Special Status Wildlife Species

Scientific Name **Common Name**	**Status**		**Survey Results**
REPTILES			
Gopherus agassizii desert tortoise	FWS:	threatened	**Present**
	BLM:	sensitive	81 adult and 21 immature tortoises were recorded within the Study Area.
	State:	protected	
	NNHP:	S2S3	
	MSHCP:	Covered	
Heloderma suspectum cinctum Gila monster	FWS:	none	**Not Detected – Moderate Potential**
	BLM:	sensitive	Moderate potential to occur in higher elevations of the alluvial fan within rocky substrates.
	State:	protected	
	NNHP:	S2	
	MSHCP:	None	
Sauromalus obsesus chuckwalla	FWS:	none	**Not Detected – Moderate Potential**
	BLM:	sensitive	Moderate potential to occur in higher elevations of the alluvial fan within rocky substrates.
	State:	none	
	NNHP:	S3	
	MSHCP:	None	
BIRDS			
Aquila chrysaetos golden eagle	FWS:	none	**Present**
	BLM:	sensitive	One pair was observed in flight over Study Area. Nesting habitat absent from Study Area. Potential territories located over five miles west near the Stateline Hills.
	State:	protected	
	NNHP:	S4	
	MSHCP:	None	
Athene cunicularia burrowing owl	FWS:	none	**Present**
	BLM:	sensitive	No live owls were observed. Historical sign (whitewash, feathers and pellets) were observed at four burrow locations.
	State:	protected	
	NNHP:	S3B	
	MSHCP:	None	
Falco mexicanus prairie falcon	FWS:	none	**Present**
	BLM:	sensitive	One individual observed adjacent to Study Area.
	State:	protected	
	NNHP:	S4	
	MSHCP:	None	
Lanius ludovicianus loggerhead shrike	FWS:	none	**Present**
	BLM:	sensitive	Eleven individual shrikes, including two pairs, were recorded within Study Area.
	State:	protected	
	NNHP:	S4	
	MSHCP:	None	
Spizella breweri Brewer's sparrow	FWS:	none	**Present**
	BLM:	none	At least thirty individuals detected within the Study Area.
	State:	protected	
	NNHP:	S4B	
	MSHCP:	None	
Toxostoma crissale Crissal thrasher	FWS:	none	**Present**
	BLM:	sensitive	One individual was detected within the Study Area. Essential habitat limited, but may occur in dense vegetation associated with larger wash systems in the upper alluvial fan.
	State:	protected	
	NNHP:	S3	
	MSHCP	Evaluated	
Toxostoma lecontei Le Conte's thrasher	FWS:	none	**Present**
	BLM:	sensitive	Twenty-eight individuals, including five pairs and three nests, were observed within the Study Area.
	State:	protected	
	NNHP:	S2	
	MSHCP:	Evaluated	

MAMMALS			
Antrozous pallidus	FWS:	none	**Not Detected – Moderate Potential**
Pallid bat	BLM:	sensitive	Moderate potential to occur within rocky substrate in upper
	State:	protected	elevations of the Study Area.
	NNHP:	S3	
	MSHCP:	none	
Corynorhinus townsendii	FWS:	none	**Not Detected – Low Potential**
	BLM:	sensitive	Large cavities for roosting and hibernation not located within
Townsend's big-eared bat	State:	protected	Study Area.
	NNHP:	S2	
	MSHCP:	none	
Myotis californicus	FWS:	none	**Not Detected – Moderate Potential**
California myotis	BLM:	sensitive	Moderate potential to occur within rocky substrate in upper
	State:	none	elevations of the Study Area.
	NNHP:	S4	
	MSHCP:	none	
Myotis ciliolabrum	FWS:	none	**Not Detected – Moderate Potential**
western small-footed	BLM:	sensitive	Moderate potential to occur within rocky substrate in upper
myotis bat	State:	none	elevations of the Study Area.
	NNHP:	S3	
	MSHCP:	evaluated	
Myotis yumanensis	FWS:	none	**Not Detected – Low Potential**
Yuma myotis bat	BLM:	sensitive	Typically associated with bodies of water, which is not
	State:	none	present within the Study Area.
	NNHP:	S3S4	
	MSHCP:	watch list	
Tadarida brasiliensis	FWS:	none	**Not Detected – Moderate Potential**
Brazilian free-tailed	BLM:	sensitive	Moderate potential to occur within rocky substrate in upper
bat	State:	protected	elevations of the Study Area.
	NNHP:	S3S4	
	MSHCP:	none	
Vulpes macrotis	FWS:	none	**Present**
desert kit fox	BLM:	none	Two burrow complexes with recent kit fox sign were
	State:	protected	recorded. Numerous canid burrows exhibiting various
	NNHP:	S3	degrees of use were observed.
	MSHCP:	none	

FWS - U.S. Fish and Wildlife Service
NNHP - Nevada Natural Heritage Program
MSHCP –Clark County Multiple Species Habitat Conservation Plan
Protected - NRS 501

NNHP State Ranks for Threats and Vulnerability
S1 - critically imperiled and especially vulnerable to extinction or extirpation due to extreme rarity, imminent threats or other factors
S2 - imperiled due to rarity or other demonstrable factors
S3 - vulnerable to decline because of rare and local throughout its range, or with very restricted range
S4 - long-term concern, though now apparently secure; usually rare in parts of its range, especially at its periphery
B - breeding status within Nevada

3.6.1 Reptiles

Desert tortoise (*Gopherus agassizii*) is a Federal-listed (Threatened), BLM-sensitive, and State-protected species. The desert tortoise inhabits flats, bajadas, and foothills supporting desert scrub, desert wash and Joshua tree habitats throughout the Mojave and Sonora deserts with appropriate soils for burrowing, and prefers areas with friable soils consisting of sand and fine gravel. Tortoises typically prefer habitats with abundant annual forbs, grasses and cacti, which constitute its primary food sources. Studies within the Eastern Mojave indicated that tortoises consumed *Camissonia boothii*, *Cryptantha angustifolia*, *Malacothrix glabrata*, *Opuntia basilaris*, *Rafinesquia neomexicana*, *Schismus barbata*, *Stephanomeria exigua* and other species (Avery 1998). Current research has suggested that plant species that have high potassium excretion potential (high-PEP) may be important to the diet of desert tortoise (Oftedal 2002; Oftedal et. al 2002). A plant with a high PEP index has a surplus of nitrogen and water, and low amounts of potassium. Excess potassium can be detrimental to the health tortoises. When excreting potassium salts from their bladder, tortoises risk expelling valuable water and protein in the process.

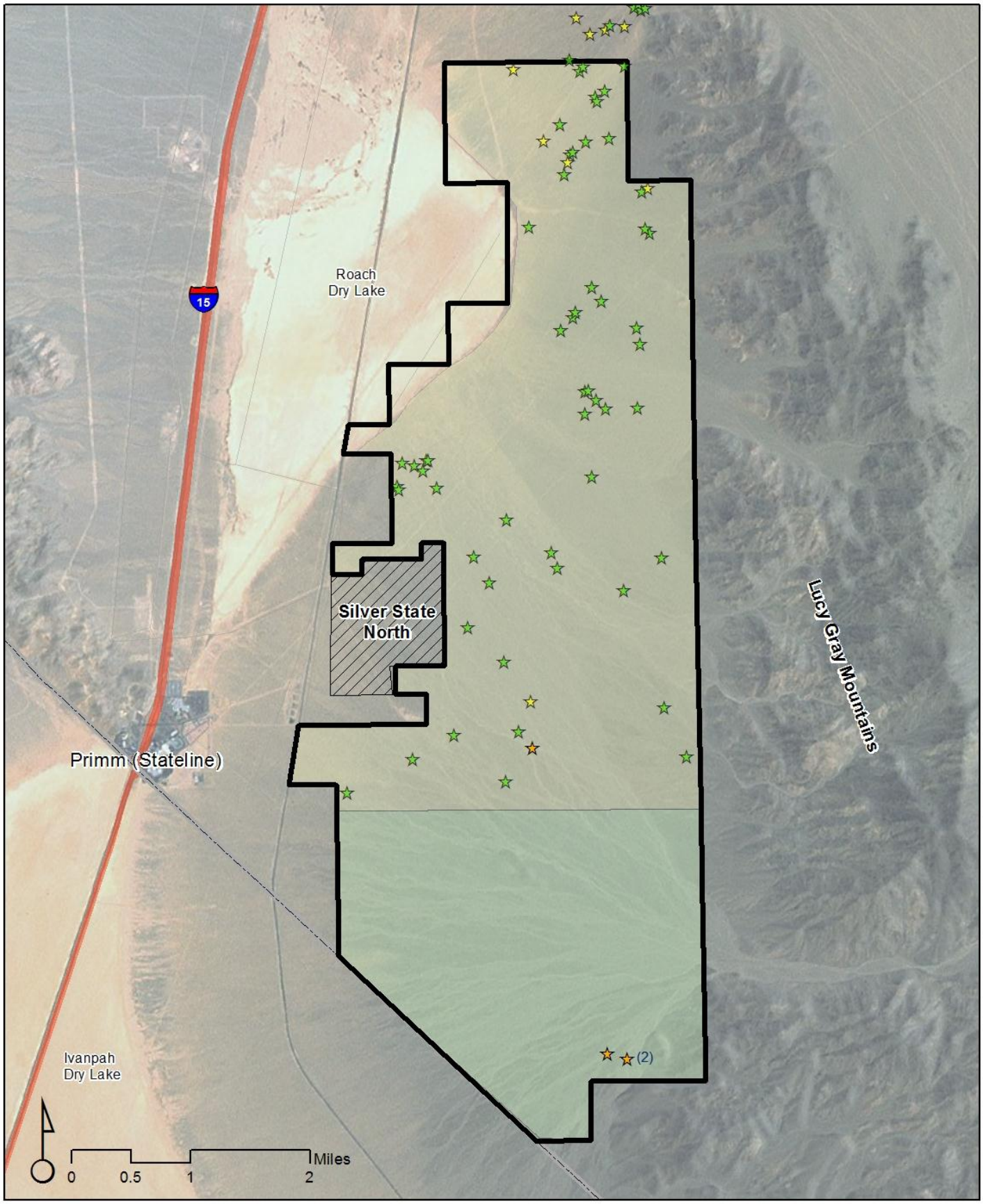
Desert tortoises generally reach sexual maturity around 12 to 15 years of age [approximately 180mm mean carapace length (MCL)]. Eggs are generally laid in friable soil at or near burrow entrances between April and June and occasionally September and October. Eggs hatch within 3 to 4 months. Activity and movement is generally influenced by temperature and recent precipitation, which correlates with potential food and water resources. Extreme temperatures, both high and low, and periods of drought typically result in reduced tortoise activity (Franks et al 2011). Desert tortoises occupy core areas, or home ranges, which often overlap between individuals. Home ranges of females are considerably smaller than of males. Annual home ranges have been calculated to vary from 10 to over 450 acres depending on demographic factors including sex, age, and density as well as environmental factors including time of year and resource availability (USFWS 1994). Across their range, female desert tortoises are known to occupy annual home ranges averaging 35 to 40 acres, while male's home ranges are generally three times the size of female's (USFWS 2010b). In Ivanpah and Roach Valleys, average female annual home ranges in 2000 and 2001 were calculated to be 21 acres (Franks et al 2011). A multiyear study conducted at Bird Spring Valley, located approximately 20 miles north of Silver State Solar South project, indicated larger average annual home ranges for both male and female tortoises. These data indicated an average annual home range of 41 acres for females and 64 acres for males (Nussear 2011). It is understood that home ranges change in size and location from year to year and an individual tortoise may occupy an area larger than its annual home range over the course if its lifetime; however, published data is limited.

The results of the 2008/2009 sampling surveys documented that desert tortoises were present within the Study Area and subsequently had the potential to be present in all areas of the project. Secondary evidence of desert tortoise presence (e.g., burrows, excrement, tracks, shell remains, etc.) was observed in almost all surveyed sections. Four live tortoises were detected during the

sampling effort. The desert tortoise survey report uses calibration values from past projects. Density estimates were calculated as less than or equal to 20 tortoises per square mile in twelve sections (square mile) and 20 to 50 tortoises per square mile in six sections. Clearance surveys that took place on the Silver State North site were completed in 2011. Those surveys revealed seven tortoises which had to be removed from the site before construction could begin. The total area encompassing Silver State North, including all areas excluded by tortoise fencing, totaled 423 acres. These data indicate an actual density of 10.6 tortoises per square mile within Silver State North.

The 2011 full coverage surveys resulted in sign of desert tortoise (i.e., live tortoises, active burrows/pallets, recent scat, and tracks) throughout the Study Area; however, live tortoise observations were not evenly distributed (Figure 5). An overall density estimate 8.1 desert tortoises per square mile was calculated for the 8,725-acres under full-coverage surveys using the formula in the USFWS 2010 revised survey protocol. Qualitative evidence of recruitment was indicated by the fact that 7% of all tortoises observed were immature (less than 160mm MCL). The large majority of immature tortoises were observed in the northern half of the Study Area (Figure 5). Ninety-one burrows of excellent condition, 289 burrows of fair to good condition, and twenty-eight burrows of poor condition were observed. Over 170 observations of scat were recorded, with the majority estimated to have been deposited within the previous year. The distribution of burrows (excellent condition) and recent scat were similar to the distribution of live tortoises (Figure 6). Four carcasses with a time-since-death (TSD) estimate of less than one year, eighty-nine carcasses with a TSD of one-to-four years, and 122 carcasses with a TSD estimate of greater than four years were observed (Figure 7). The majority of carcasses were recorded in the southern half of the Study Area. Many appeared to have died approximately four years prior and may correlate with a notable drought period that lasted through 2008. Additional surveys extending north of Silver State Solar Power South, LLC's ROW boundary showed the greatest concentration of tortoises located northwest of the Lucy Gray Mountains. This area also indicated recruitment with more than 20% of tortoises being immature, including four measuring less than 80mm MCL.

The Study Area is substantially larger than the alternative site layouts, which allows project features to be adjusted for avoidance of high tortoise concentrations while still meeting project objectives. Additional calculations were performed for each of the three currently proposed alternative site layouts (Table 7). Tortoise estimates were derived using both the 2008/2009 TRED sampling [as referenced in the FEIS (BLM 2010)] for Alternative C and the 2011 full coverage survey data [using the USFWS estimation formula (USFWS 2010b)] for Alternatives B and D. Confidence intervals, or ranges, were generally wider for estimates derived from sampling when compared to full coverage. Each alternative's abundance and density estimates are discussed following Table 7.



Study Area

2011 Full Coverage

2008-2009 TRED Sampling

2011 Full Coverage

Adult Tortoise (>160mm MCL)

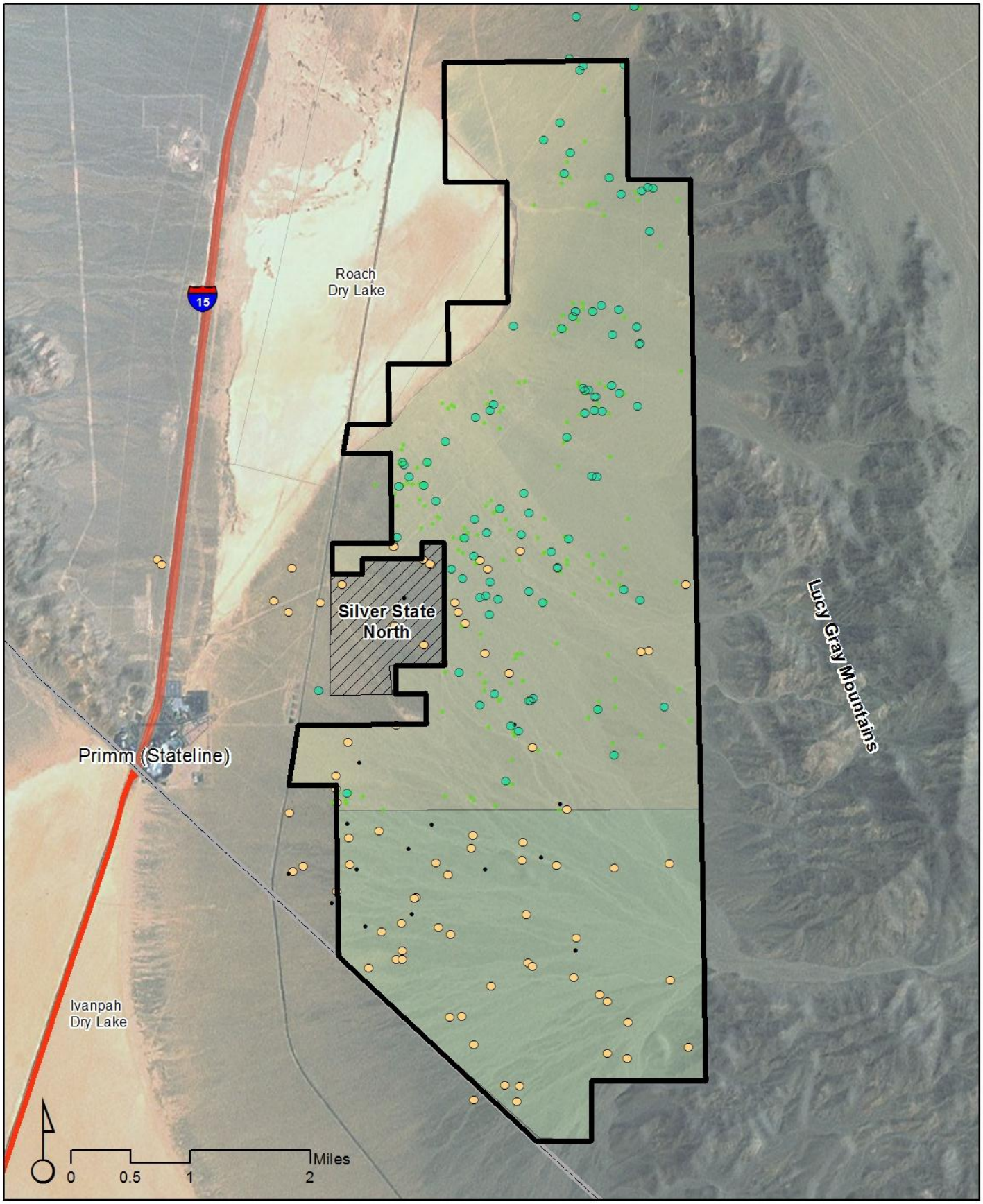
Immature Tortoise (<160mm MCL)

2008-2009 TRED Sampling

Adult Tortoise (>160mm MCL)

Silver State Solar South

Figure 5
Live Tortoise Observations



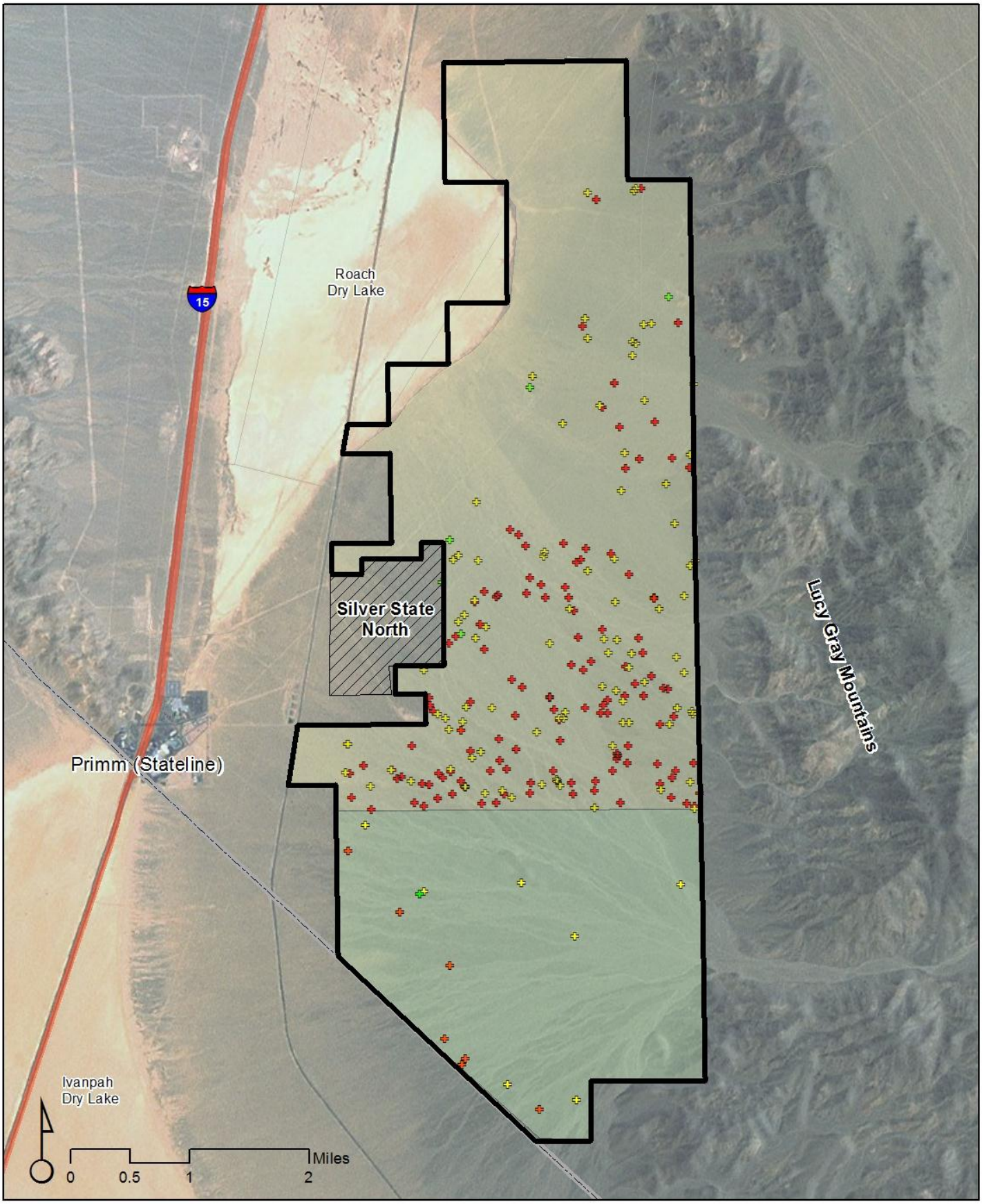
Study Area
2011 Full Coverage
2008-2009 TRED Sampling

2011 Full Coverage
Burrow (excellent condition)
Scat (this year)

2008-2009 TRED Sampling
Burrow
Scat (this year)

Silver State Solar South

Figure 6
Additional Active Tortoise Sign



Study Area
2011 Full Coverage
2008-2009 TRED Sampling

Time Since Death
<1 yrs
2-4 yrs
>4 yrs

Silver State Solar South

Figure 7
Tortoise Carcasses

Table 7 - Comparison of Desert Tortoise[1] Calculations per Alternative

Alternative/Site	Size (acres)	Point Estimate (Tortoises)	Range Estimate (Tortoises)	Density Point Estimate (tortoises/mi^2)	Density Range Estimate (tortoises/mi^2)
Alternative B	3,855	41[2]	19 to 85	7	3 to 14
Alternative C[3]	2,515	76	36 to 105	19	9 to 27
Alternative D[4]	3,102	29[2]	13 to 64	6	3 to 13

[1] Adult Tortoises (>160mm MCL) - range estimates based on lower and higher 95% confidence interval

[2] Estimates derived from full coverage surveys and USFWS formula (USFWS 2010b)

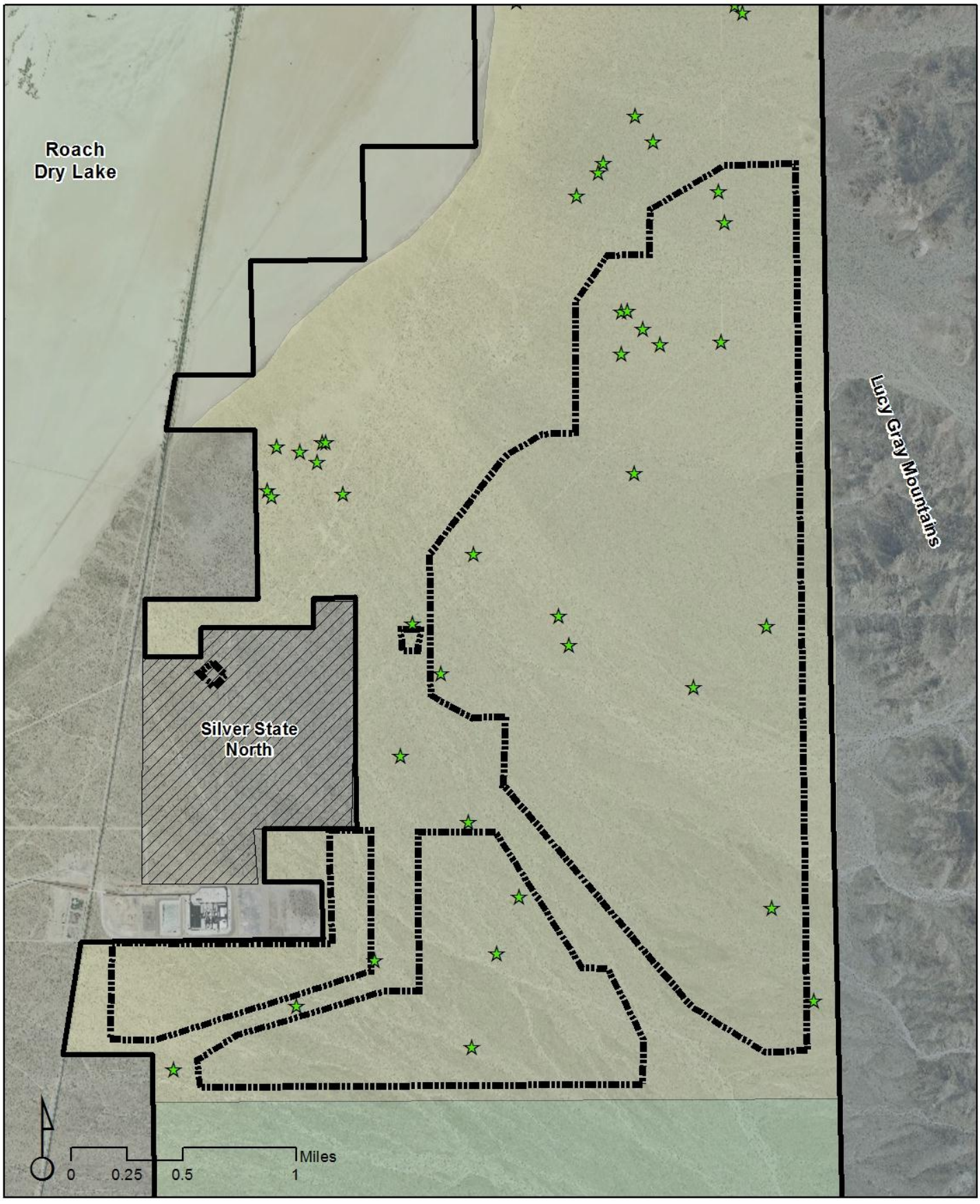
[3] Estimates from TRED sampling (BLM 2010). Estimates scaled down to excludes Silver State North (developed)

[4] Estimates scaled up to include linear components and associated project features.

Alternative B was completely surveyed during the 2011 full coverage transects. Twenty adult tortoises were recorded within the 3,855-acre footprint (Figure 8). Although the number of adult tortoises observed was higher than in the other alternatives, the size of the site layout was considerably larger, resulting in a relatively low density (point estimate of seven tortoises per mi^2). Alternative B was estimated to support between nineteen to eighty-five adult tortoises, with a point estimate of forty-one adult tortoises.

Alternative C was surveyed in 2008 and 2009 via TRED methodology. Four individual tortoises were located during the sampling surveys. Calculations yield an estimate of 88 tortoises for 2,967 acres. The 2,515 acres of undeveloped footprint (which excludes the developed Silver State North site and associated linear features) was deducted utilizing the data collected for the entire 2,967 acre site. The undeveloped areas of alternative C were estimated to support between thirty-six to one hundred and five adult tortoises, with a point estimate of seventy-six adult tortoises.

Alternative D was completely surveyed during the 2011 full coverage transects, with the exception of a narrow strip along the southern boundary and a small extension of the proposed basins, which total less than ninety acres. Fourteen adult tortoises were recorded within the 3,102 acre footprint of Alternative D (Figure 10). Alternative D is estimated to support between thirteen to sixty-four adult tortoises, with a point estimate of twenty-nine adult tortoises. The alignment of Alternative D shifts the project's impact area to an area of lower tortoise density (approximately six adult tortoises per mi^2) and tighter confidence interval than the previous Alternatives B and C. The calculations for Alternative D relied on density extrapolation for the ninety acres that fell outside the full coverage survey area and additional linear features. These areas were included in the overall estimate by using density data from the remaining 97% of Alternative D that was covered by full coverage surveys. The calculations for Alternative D included habitat between the project site fenced boundary and upslope detention basins. These areas would technically remain desert tortoise habitat but are effectively secluded by the project. Although the additional acreage is not technically part of the solar farm footprint, the small areas of tortoise habitat included in the calculation will likely be affected due to their locations between project features.



Silver State Solar South

Figure 8
Alternative B
Live Tortoise Observations

2008-2009 TRED Sampling

Study Area

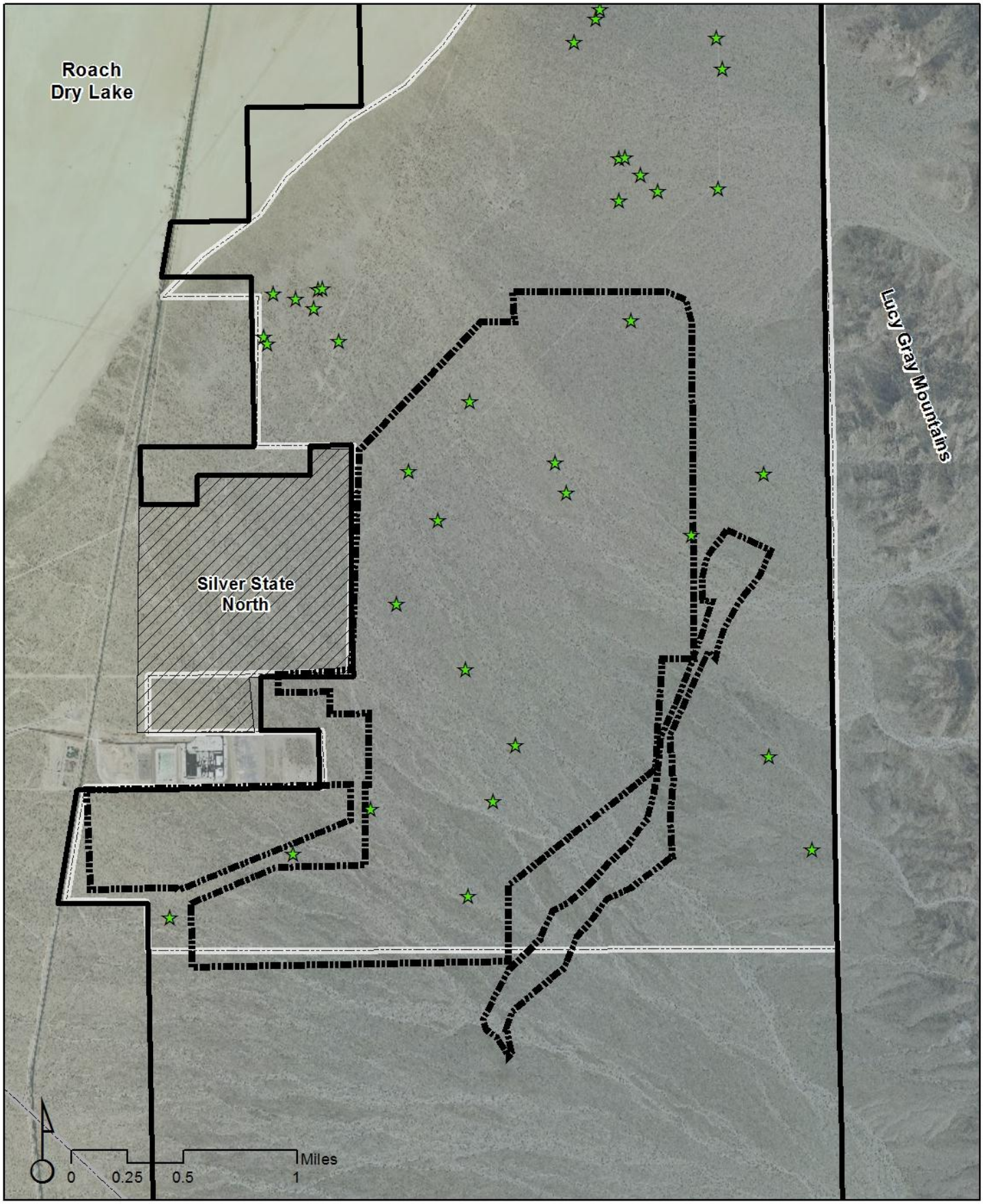
Alternative C

< 20 tortoises per mi2

21 to 50 tortoise per mi2

Silver State Solar South

Figure 9
Alternative C
TRED Sampling Densities



Study Area

Alternative D

Adult Tortoise
(>160mm MCL)

Silver State Solar South

Figure 10
Alternative D
Live Tortoise Observations

3.6.2 Birds

Golden eagle (*Aquila chrysaetos*) is a BLM-sensitive, State-protected species subject to the federal Migratory Bird Treaty Act (MBTA) and Bald and Golden Eagle Protection Act. This large eagle is found throughout the United States typically occurring in open country, prairies, tundra, open coniferous forest and barren areas, especially in hilly or mountainous regions. Within the desert regions, this species usually builds nests on cliff ledges. Breeding in Southern California starts in January, nest building and egg laying in February to March, and hatching and raising the young eagles occur from April through June. Once the young eagles are flying on their own, the adult eagles will continue to feed them and teach them to hunt until late November. Due to the large investment in energy and time that an adult golden eagle is required to provide in raising young, some eagles will forgo a season of reproduction even when food supply is abundant (WRI 2010). One pair of golden eagles was observed soaring overhead near the eastern boundary of the Study Area during the surveys. In 2010, Wildlife Research Institute (WRI) conducted aerial surveys of a ten-mile radius around the proposed Stateline project site west of Ivanpah Lake. These surveys extended east across the valley and included the Lucy Gray Mountains. WRI recorded no golden eagles within the Study Area limits or within the Lucy Gray Mountains; however, they detected four possible golden eagle territories within ten miles of the Silver State Solar South Study Area: Umberci Mine (approximately 8 miles west), Devil's Peak (approximately 7 miles west), Stateline Hills (approximately 7 miles west), and Ivanpah Valley (approximately 5 miles west). The next proximate potential golden eagle nesting habitat is located over seven miles east of the Study Area within the McCullough Range. Relevant data that may become available from other studies within the vicinity of Silver State South (e.g., Eldorado-Ivanpah Transmission Project) will be evaluated as it becomes available.

Western burrowing owl (*Athene cunicularia*) is a BLM-sensitive, State-protected species and is protected by the MBTA. It is historically known to occur in open, dry grasslands, agricultural and range lands, and desert habitats often associated with burrowing animals. This species typically nests in mammal burrows although they may use man-made structures including culverts and debris piles. They exhibit strong nest site fidelity. Burrowing owls eat insects, small mammals and reptiles. Burrowing owls can be found from California to Texas and into Mexico. In some cases, owls migrate into southern deserts during the winter. Evidence of burrowing owl presence was recorded at four burrow locations (Figure 11). Burrowing owl sign consisted of whitewash excrement, pellets, and feathers. No live burrowing owls were observed. Burrowing owls may reside within the Study Area, but likely in low densities.

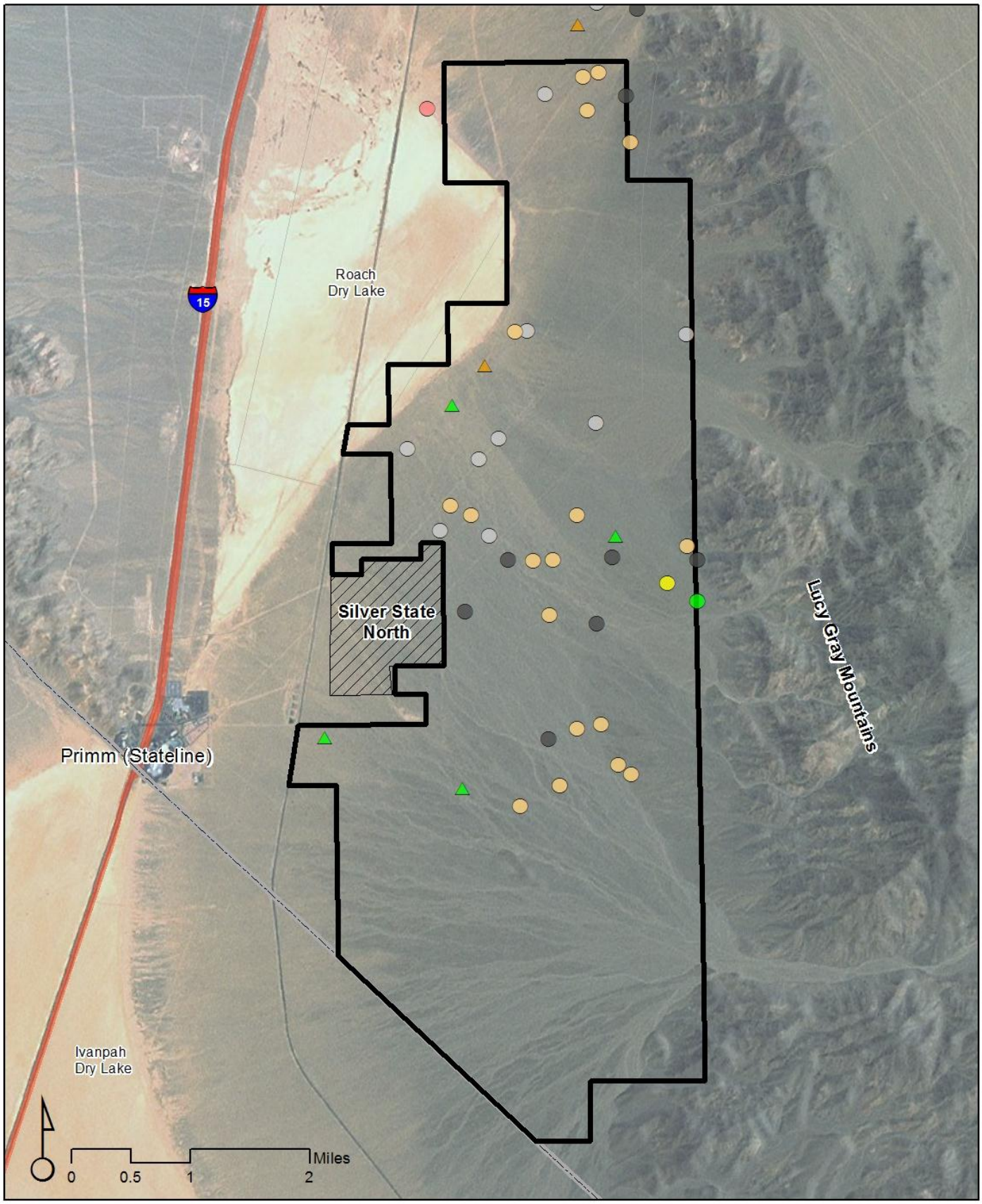
Prairie falcon (*Falco mexicanus*) is a BLM-sensitive, State-protected species and is protected by the MBTA. This large falcon typically builds nest sites on cliffs, similar to the golden eagle. In the desert they are found in most vegetation types, although sparse vegetation provides the best foraging habitat. In the Mojave, mean home range size has been found to be approximately 50 to 70 km² (Harmata et al. 1978).

A single prairie falcon was observed in flight just west of the Study Area north of Roach Lake (Figure 8). Nesting habitat for this species does not occur within the Study Area. The nearest possible nesting habitat is within the Lucy Gray Mountains. Prairie falcons are expected to be an infrequent forager within the Study Area.

Loggerhead shrike (*Lanius ludovicianus*) is a BLM-sensitive, State-protected species and is protected by the MBTA. It typically is found in open habitats with scattered shrubs, trees, posts, fences, utility lines, or other perches. As a predatory bird its diet consists of insects, amphibians, small reptiles, small mammals, and other birds. Shrikes typically build nests one to three meters above the ground depending on the height of the vegetation. Seven individual loggerhead shrikes were recorded during the surveys, including two pairs (Figure 11). This species can be considered present and may be a year-round resident within the Study Area.

Brewer's sparrow (*Spizella breweri*) is a State-protected species and is protected by the MBTA. This species typically breeds in shrub habitats, such as sagebrush habitats east of Sierra Nevada Range and in higher valleys of the Mojave Desert. It is somewhat common in open desert habitats during the winter. Brewer's sparrow feeds on insects and seeds on the ground or in low shrubs. This species primarily breeds from May through August with a peak in June. At least thirty individual Brewer's sparrows were detected through direct observation and/or vocalization within the Study Area. This species can be considered present and may be a year-round resident within the Study Area.

Crissal Thrasher (*Toxostoma crissale*) is State-protected and classified by the NNHP as vulnerable to decline because of its status as rare and local throughout its range, or with very restricted range. This species occupies a relatively large variety of desert riparian and scrub habitats from below sea level to over 6,000 feet amsl. Crissal thrashers are typically most abundant near riparian scrub or woodland at lower elevations (e.g., Colorado River valley), and low, dense shrublands associated with washes at higher elevations in the Mojave Desert (Shuford and Gardali 2008). Dominant plant species in occupied habitat include mesquite (*Prosopis* spp.), catclaw (*Acacia greggii*), ironwood (*Olneya tesota*), palo verde (*Cercidium* spp.), desert-thorn (*Lycium cooperi*), and saltbush (*Atriplex* spp.). Riparian scrub and woodland is not present within the Study Area; however, the larger wash systems that originate higher in the Lucy Gray Mountains may support dense, wash-dependent shrub and trees species that serve as habitat for this species. One individual crissal thrasher was observed along the eastern boundary of the Study Area. The distribution of appropriate habitat for this species within the Study Area is limited, but there is a potential for crissal thrashers to occupy the dense vegetation within the larger wash systems at higher elevations.



Study Area

Observations are not presented for southern study area.

- Brewer's sparrow
- Crissale thrasher
- Golden Eagle
- LeConte's Thrasher
- Loggerhead Shrike
- Prairie Falcon
- Burrowing Owl Sign
- Desert Kit Fox Complex

Silver State Solar South

Figure 11
Special Status Wildlife Species

Le Conte's thrasher (*Toxostoma lecontei*) is a BLM-sensitive, State-protected species and is protected by the MBTA. This species is a year-round desert resident that inhabits various desert scrub and wash habitats and typically breeds in desert areas that support cactus, Mojave yucca (*Yucca schidigera*), Joshua trees (*Yucca brevifolia*), and large thorny shrubs such as *Lycium* spp. This species is distributed from the Mojave Desert east into southern Utah and northern Arizona, and south into northern Mexico. Twenty-eight individual thrashers, including five pairs, were detected within and around the Study Area. Three nests belonging to this species were also observed. This species is likely a year-round resident within the Study Area.

3.6.3 Mammals

Focused surveys for bat species were not conducted. Four special status bat species have a moderate potential to occur including pallid bat (*Antrozous pallidus*), small-footed myotis (*Myotis ciliolabrum*), California myotis (*Myotis californicus*), and Brazilian free-tailed bat (*Tadarida brasiliensis*). These species have the potential to occur within the rocky substrate of the higher elevations within the Study Area where potential crevice roosting habitat occurs.

Desert kit fox (*Vulpes macrotis*) is a State-protected species and classified by the NNHP as vulnerable to decline because it is rare throughout its range. Kit foxes are primarily carnivorous and prey on black-tailed jackrabbits, desert cottontails, small mammals, insects, reptiles (sometimes small desert tortoises, and birds [including eggs]). They typically dig burrows and dens in open, level areas with loose-textured, sandy and loamy soils. These burrows may also be used by other species including burrowing owls. Dozens of canid burrows possibly used by desert kit fox were observed during the surveys. One burrow complex exhibited recent active sign of both tracks and scat (Figure 8). Kit fox is likely a year-round resident within the Study Area.

4.0 DISCUSSION AND RECOMMENDATIONS

4.1 Desert Tortoise

4.1.1 Project Alternatives

Observations of live desert tortoises and tortoise sign were not distributed evenly throughout the Study Area; rather, observations were sporadic and in some cases occurred in distinct concentrations. This type of distribution is typical of desert tortoises especially during the spring when activity and movement increases. Movement patterns during the spring are typically related to foraging and mating activities. Tortoise distribution is undoubtedly dynamic over time; however, the tortoise distribution illustrated in this report is valuable in showing large-scale conditions within the full Study Area and has allowed for project design to avoid direct impacts to areas of tortoise concentrations and higher density. Based on the data collected, project development located in the northern extents of the Study Area would be expected to have greater direct impacts to desert tortoises and connectivity than if located in the southern portion of the Study Area. Examination of various project alternatives supports this, with Alternative D showing both the lowest point estimates and densities for desert tortoises within the proposed development footprint. Consideration should be made when comparing density estimates for Alternative C with other alternatives as these estimates relied on sampling data, which has inherently larger confidence intervals. The point estimates for Alternative C may behigher as a result of the sampling methodology than compared to Alternatives B and D that relied on full coverage data.

4.1.2 Habitat and Genetic Connectivity

Effects to desert tortoises should further be evaluated in context with the Desert Tortoise Recovery Plan (USFWS 1994 and 2011c). The Recovery Plan addresses conservation and enhancement of desert tortoise populations as a whole and also within distinct recovery units. The USFWS recently provided guidance addressing that the preservation of habitat connectivity and genetic flow between large geographically distant populations, specifically the potential connectivity between the Ivanpah and Piute-Eldorado Critical Habitat Units (CHU), is of special importance (USFWS 2011a, 2011b, and 2012). Recent studies have indicated potential connectivity between these CHUs is located north-south through eastern Ivanpah/Roach Valley, which is in the vicinity of Silver State Solar South, and east-west through the northern McCullough Range south of Hidden Valley (Hagerty 2010 and Nussear 2009). Alternative B may constrict potential habitat connectivity between the project and the Lucy Gray Mountains due to the eastern extent of the layout. In comparison, Alternatives C and D are located further to the west to allow for higher potential of functional habitat connectivity between the project and the Lucy Gray Mountains.

Maintaining connectivity between large core habitat areas is important for preserving gene flow among individuals of a population. Gene flow promotes higher genetic variability, or heterozygosity, which improves overall fitness of a species. Peripheral, or isolated, populations can undergo genetic drift and a loss of heterozygosity, which may result in a loss of fitness and subsequently make the isolated population more vulnerable to environmental and demographic stochastic events. Even infrequent gene flow (e.g., one reproductive tortoise every ten years) across a constrained linkage could be sufficient to preserve genetic heterozygosity between two connected core areas (Bury et al. 1988). Some studies indicate that many tortoise generations are required to detect significant genetic drift in isolated populations (Bury et al. 1988). While others have been successful in illuminating genetic subpopulations resulting from anthropogenic features over a much shorter duration (Latch et al. 2011).

Within Ivanpah and Roach Valleys, baseline conditions include historical anthropogenic features that limit connectivity including Interstate 15, Primm developments, and the existing railroad. It is expected that these features have affected genetic flow within the tortoise population of both valleys. Further analysis is ongoing to determine the baseline condition for desert tortoise connectivity between the Ivanpah CHU and Piute-Eldorado CHU. Connectivity studies lead by Kenneth Nussear, research herpetologist with the U.S. Geological Survey (USGS), are underway in spring of 2012 to provide data on the rate of tortoise interaction within the high elevation passes within both the McCullough Range on the east side of Interstate 15 and Stateline Pass on the west.

Several recent studies and models have provided useful information regarding desert tortoise habitat connectivity. Habitat connectivity can be assessed on varying geographic scales. The identification of existing barriers and viable corridors at ground level is important to understanding the level of tortoise connectivity occurring under current conditions and within specific geographic locations. Conditions of functional habitat connectivity are site-specific and are dependent upon several factors including existing densities, habitat quality, demographics, existing threats, and size and dimension of available habitat. For a corridor to provide functional connectivity it should be occupied by desert tortoises in densities sufficient to allow for overlapping home ranges between males and females. This would allow for genetic exchange to occur through the corridor. Individual annual home ranges can be dynamic from year to year and be dependent on demographic factors including sex, age, and density as well as environmental factors including time of year and resource availability (USFWS 1994). Thus, the cumulative home range of resident tortoises should be considered; however, there is a lack of published data that provides such quantification.

The best available scientific data that can be used is multiyear annual home range analysis. For Silver State Solar South, the most relevant (proximate) data should be derived from Ivanpah and Roach Valley and neighboring watersheds. When assuming a circular annual home range, its diameter serves as a starting point in this analysis. For example, a 500 acre circular home range, which is thought to be the maximum limit for a male tortoise, would have diameter of 1.0 mile. Studies conducted in the Ivanpah Valley indicated annual home range variance (males and females combined) from 0.10 to 0.66 mile in diameter (Berry 1986, Franks et al 2011, and Nussear 2011).

Existing studies, the results of ongoing studies, as well as continued coordination with the USFWS and USGS and their efforts to model tortoise habitat quality and further evaluate on the ground patterns of tortoise interaction and movement, would result in a greater understanding of habitat connectivity requirements for desert tortoise. These studies would provide the foundation for future monitoring which is described further in Section 4.1.3.

4.1.3 Effectiveness Monitoring Program

Studies analyzing home range and distribution of tortoises in the area surrounding the project site have recently been proposed for an approximately 13,000 acre research area in the Ivanpah and Roach Valleys within both California and Nevada. The goal of the research is to obtain preliminary ecological data for all resident desert tortoises by determining home range size, habitat use, disease, and contaminant prevalence and exposure. The home range and core areas of use will be determined and correlated with large-scale landscape features (mountains, lake beds), anthropogenic features (highways, power line corridors) and diseased conspecifics, providing baseline ecological data. Contaminant testing will be conducted on a subset of tortoises to establish baseline data for persistent organic compounds (POPs, associated with pesticides), polycyclic aromatic hydrocarbons (PAHs, associated with a traffic source), non-targeted analysis, screening for a wide range of organic chemicals (to establish preliminary data) and metal analysis, both toxic and rare earth metals (relating to mining activities in the region). These activities are anticipated to (1) contribute to the existing knowledge base for desert tortoises in the Ivanpah/Roach Valley, (2) explore how anthropogenic pollutants may impact desert tortoises, and (3) inform potential future translocation events resulting from projects in the valley. The proposed study has been designed and funded to render complete results, analysis, and reporting following one full year of data collection, which is planned for 2012.

As mentioned in the previous section, connectivity studies lead by Kenneth Nussear, research herpetologist with the USGS, are underway in spring of 2012 to provide data on the rate of tortoise interaction within the high elevation passes within both the McCullough Range on the east side of Interstate 15 and Stateline Pass on the west. With the overall goal of maintaining connectivity, it is crucial to know if existing corridors actually provide the desired connectivity. Gene flow is the ultimate goal of habitat connectivity; however this is difficult to determine when studying desert tortoise due to their long generation time. With the use of modern technology (i.e., proximity detectors or GPS data loggers) specific data and inferences can be obtained to

record animal to animal interaction. Ultimately, connectivity will be measured using the number and distribution of tortoise contacts through the corridor and can be compared to rates of tortoise contact and connectivity in open habitat.

Silver State Solar Power South, LLC has contributed funding for these surveys. In total, these studies would serve as baseline for the future effectiveness monitoring program. Continuation of effectiveness monitoring program would be expected to meet the requirements of the USFWS translocation guidelines (USFWS 2011d).

4.1.4 Protection Measures

Due to the expected presence of desert tortoise within the Project site, formal consultation between the BLM and USFWS would be necessary. A biological assessment that fully addresses the impacts to desert tortoise would be required to initiate formal consultation. The measures described in this section of the report reflect standard requirements and may be incorporated as part of the proposed Project, which would also be included in the biological assessment. The Biological Opinion (BiOp) would provide specific conditions and requirements that may supersede some of the following measures. A Lead Biologist should be designated for the Project and should be responsible for all aspects of clearance surveys, monitoring, desert tortoise translocation, contacts with agency personnel, reporting, and long-term monitoring and reporting.

Exclusion Fencing

Prior to beginning clearance surveys, desert tortoise exclusion fencing should be constructed in specified areas consistent with clearance survey areas. The Project site should be completely fenced with security and desert tortoise exclusion fencing, including desert tortoise exclusion gates at access points. Fence installation should be monitored as a linear component. Exclusion fencing should be maintained over the course of construction and operations, as necessary.

Preconstruction Clearance Surveys

Clearance surveys should be conducted consistent with the USFWS Desert Tortoise Field Manual and current translocation guidance (USFWS 2009 and 2011d). If a desert tortoise or active burrow is found within a planned area of construction, surveys should stop at that time until the tortoise is translocated in the active season. If two complete passes are completed in a construction area (north-south and east-west) without a desert tortoise being found, construction may commence within that area outside of active season. Fencing should continue to be checked on a daily basis throughout construction.

Translocation

A Desert Tortoise Translocation Plan should be prepared for the Project. The purpose of the plan is to describe the process of translocation, minimize mortality of desert tortoises, and assess the effectiveness of the translocation effort through a long-term monitoring program. Injured tortoises should be transported to a rehabilitation facility approved by the USFWS and NDOW. Tortoises found recently killed should be salvaged and transported to a veterinary pathologist,

who is familiar with desert tortoise and approved by the USFWS and NDOW. Procedures for salvaging and transport should generally follow Guidelines for the Field Evaluation of Desert Tortoise Health and Disease (Berry and Christopher 2001). Detailed health assessments on all live tortoises should be conducted following current USFWS guidance by individuals approved and permitted by the USFWS to conduct such assessments. Detailed health assessments should be performed prior to translocation and repeated periodically during long-term monitoring. Any individual tortoise that exhibits clinical signs of Upper Respiratory Tract Disease (URTD) should be transported to the Desert Tortoise Conservation Center (DTCC) near Las Vegas, Nevada for further evaluation. Tortoises should only be prepared for transport to the DTCC by individuals authorized for these activities under the BiOp. The tortoise should be transported to the DTCC within 48 hours of it being discovered with clinical signs of disease.

Avoidance – Construction

During the construction of linear features (fencing, transmission lines, and access roads), all live tortoises and active burrows should be avoided to the extent possible. All activities should be monitored by qualified biologists. The biological monitor should instruct crews to provide approximately one hour for a live tortoise to leave an active construction area without assistance. If the tortoise does not leave the area on its own an Authorized Biologist (listed under the BiOp to handle tortoises) should carefully move the tortoise out of the construction area and into a translocation area pursuant to the conditions of the BiOp. Biological monitors should flag an avoidance area approximately 20 meters from any active burrow to be avoided and construction activities should continue around this avoidance area while a biologist monitors the burrow. If an active burrow cannot be avoided by construction activities, the burrow should be excavated using protocols in USFWS Desert Tortoise Field Manual (USFWS 2009).

In addition, during the construction of non-linear project features, and after initial fencing and clearance, a biological monitor should be available during all ground disturbing activities. The project biologist should be available to ensure the conditions of the BiOp are being met, including worker education guidelines, avoidance and minimization measures, and construction monitoring requirements. Additional guidelines may include mitigation for common ravens and noxious weeds. General mitigation measures are listed in section 4.3.

Avoidance – Operations and Maintenance

During the operation phase of the project, all applicable desert tortoise protection measures identified under construction should be implemented. For example, this may include the need for a biological monitor outside the fenced facility during road, fence and utility maintenance involving ground disturbance, annual Worker Environmental Awareness Program refresher, actions to take if a tortoise is encountered, etc. Additionally, a biological monitor should be designated and responsible for overseeing compliance with the desert tortoise protection measures. The biological monitor should have a copy of all measures including the BiOp when work is being conducted on site. The monitor should be on site during all project maintenance activities to ensure compliance with the desert tortoise measures. The monitor should have the

authority to halt all non-emergency activities that are in violation of the measures. Work should proceed only after hazards to desert tortoise are removed, the species is no longer at risk, or the individual has been moved from harm's way by an authorized biologist. An annual compliance report should be submitted to the BLM annually.

4.2 Special Status Plant Species

Three special status plants species were identified within the Study Area: Death Valley ephedra, white-margined beardtongue, and yellow two-toned beardtongue. Depending on the location of the proposed site layout, some or all of these species may be affected. The majority of white margined beardtongue occurred north of the alignment of all three alternatives. In addition, the population of yellow two-toned beardtongue located in the study area occurred primarily to the east of Alternatives C and D, however this species would be affected by Alternative B. It is recommended that mitigation techniques possibly involving seed collection, nursery development, and/or transplantation are evaluated to determine the most effective approach if the selected alternative results in impacts to these species. Techniques may differ for each species, as well as each proposed alternative.

Further coordination between Bureau of Land Management, U.S. Fish and Wildlife Service, and Nevada Department of Wildlife may be necessary to determine the full scope of required permitting, implementation of specific protection measures, and/or compensatory mitigation. The following information is intended to provide the NEPA document preparers an outline for general avoidance and minimization measures potentially relevant to the Silver State South Project.

4.3 General Measures

This section describes a range of design features, construction and operation best management practices (BMPs), and avoidance practices that when implemented as part of Project construction and/or operation, should collectively avoid, reduce or eliminate potential adverse effects to biological resources. Each category of features, practices and plans is described separately below.

<u>Construction Related Plans</u>

The following construction related plans should be developed, as necessary. These plans have specific objectives that would indirectly help reduce potential adverse effects to biological resources.

- Storm Water Pollution Prevention Plan
- Dust Control Plan
- Waste Management Plan
- Spill Prevention Control and Countermeasure Plan
- Hazardous Materials Management Plan
- Fire Prevention Plan

Environmental Inspection and Compliance Monitoring Program and Plan

A comprehensive Environmental Inspection and Compliance Monitoring Program and Plan, covering both construction and operation and maintenance (O&M), should be developed. A qualified individual should be designated to serve as the Project Environmental Manager. The Environmental Manager should be responsible for:

- development and implementation of the overall Project compliance program,
- communication and coordination with the applicable regulatory agencies,
- ensuring compliance with the various conditions and requirements of permits and approvals,
- record keeping and reporting required by permits and approvals,
- ensuring that all applicable environmental plans are up to date,
- advising management of actual and potential compliance issues, and
- ensuring that Project planning takes appropriate account of compliance issues in advance.

Construction Related BMPs

The following general measures should be implemented during construction, which would assist with reducing potential adverse effects to biological resources:

- Construction and O&M activities should be limited to daylight hours to the extent possible,
- Water required for construction purposes should not be stored in open containers or structures and should be transported throughout the site in enclosed water trucks,
- Water sources (such as wells) should be checked periodically by monitors to ensure they are not creating open water sources through leaking or consistently overfilling trucks,
- All vehicles leaking fuel or other liquids should be immediately removed to the staging area and repaired – all spills should be cleaned up promptly and disposed of correctly,
- All construction activities conducted outside the fenced areas should be monitored by a qualified biological monitor,
- Vegetation removal should be limited to the smallest area necessary,
- Construction traffic should remain on existing roads when possible – new roads, passing areas, and turning areas should be limited to permitted area of direct effect,
- Speed limits on all unpaved areas of the Project site should be a maximum of 15 miles per hour,
- Trash should always be contained within raven-proof receptacles and removed from the site frequently, including trash collected in vehicles in the field,
- No dogs or firearms should be allowed on the Project site during construction or O&M, and
- Plant and wildlife collection by Project staff during construction or operation should be prohibited except as allowed by the Project's permits.

Worker Environmental Awareness Program

A formal Worker Environmental Awareness Program (WEAP) should be completed for every individual working on the Project site. All individuals completing the training should sign an attendance sheet and receive wallet cards and stickers to show they have completed this training. The training should include the following information and include photos of all resources:

- Discussion of the fragile desert ecosystem, vegetation and wildlife communities within and surrounding the Project site,
- Discussion of rare plant species and other sensitive species found within and surrounding the Project site,
- Desert tortoise ecology, threats, legal protections, permitting, and penalties (including both legal and imposed by Project permits),
- Project-specific protection measures, and
- Worker responsibilities, communication protocol, and monitor responsibilities, including the authority for monitors to halt Project activities if warranted.

4.4 Other Biological Resource Protection Measures

Integrated Weed Management Plan

An Integrated Weed Management Plan (IWMP) should be prepared to reduce and/or eliminate the propagation and further spread of noxious and invasive weeds in the Mojave Desert due to construction, operation and decommissioning of the Project. The objectives of the IWMP would be as follows:

- Identify weed species currently present within the Project components,
- Identify weeds not seen on the Project components that may have the potential to be present in the Project area and have the potential to invade the Project site due to construction activities,
- Identify construction and maintenance activities that may increase the presence of weeds or introduce new weed species on and adjacent to the Project components, and
- Specify steps that should be taken to ensure that the presence of weed populations on and adjacent to the Project components should not increase because of construction activities. These steps should be intended to: (1) prevent weeds not currently found on the Project site from becoming established there, and (2) prevent weeds already present on the site from spreading to other areas.

Avian and Bat Protection Plan

Due to the potential presence of golden eagle, raptors, and bat species within the Project site, an Avian and Bat Protection Plan (ABPP) should be developed. The goal of the ABPP would be to reduce the potential risks for avian and bat mortality potentially resulting from construction and operation of the Project. The objectives of this plan are as follows:

- Identify baseline conditions for raptor and bat species currently present at the Project components,
- Identify construction and operational activities that may increase the potential of adverse effects to these species on and adjacent to the Project components,
- Specify steps that should be taken to avoid, minimize and mitigate any potential adverse effects on these species, and
- Detail long-term monitoring and reporting goals.

Vegetation Management Plan

The Vegetation Management Plan (VMP) will address impacts to native vegetation and special status plant species during construction and maintenance of the solar facility. The Plan will include a discussion of the limited grading approach to ground preparation and include procedural descriptions for transplantation, restoration, and reclamation of affected areas. Objectives of the VMP include:

- Present methods of salvage and transplantation of succulent/yucca/cactus and other special-status plant species,
- Describe restoration of temporarily disturbed areas using salvaged topsoil and certified weed free native vegetation,
- Specify proper seasons and timing of restoration and reclamation activities, and
- Detail monitoring and reporting goals.

4.5 Compensatory Mitigation

To compensate for desert tortoise habitat loss, remuneration fees should be acquired to partially offset the potential adverse effects of the Project. Fees would be collected following guidance in BLM's August 17, 2010, instruction memorandum (NV-2010-062) as listed in the Biological Opinion for the Silver State Solar Project (USFWS 2010a). Continued coordination with the BLM, NDOW, and USFWS would be beneficial in identifying all possible compensatory mitigation opportunities as they arise.

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APPENDIX A
Site Photographs

Photo 1 - *Larrea tridentata-Ambrosia dumosa* Shrubland in foreground. *Yucca schidigera-Larrea tridentata-Ambrosia dumosa* Shrubland in upper alluvial fan. Lucy Gray Mountains in background.

Photo 2 - *Yucca schidigera-Larrea tridentata-Ambrosia dumosa* Shrubland in foreground.

Photo 3 – *Larrea tridentata-Ambrosia dumosa* Shrubland.

Photo 4 - *Atriplex polycarpa* Shrubland near playa. *Larrea tridentata-Ambrosia dumosa* Shrubland Alliance in background.

APPENDIX B
Plant Species Detected

Genus	Species	Var./Sp.	Common name	Family	Status
Acacia	greggii		catclaw acacia	Fabaceae	
Acamptopappus	shockleyi		Shocklye's goldenhead	Asteraceae	
Acamptopappus	sphaerocephalus	var. hirtellus	goldenhead	Asteraceae	
Achnatherum	hymenoids		indian ricegrass	Poaceae	
Achnatherum	speciosum		desert needlegrass	Poaceae	
Adenophyllum	cooperi		Cooper's dogweed	Asteraceae	
Allionia	incarnata		trailing allonia	Nyctaginaceae	
Ambrosia	eriocentra		Wolly bursage	Asteraceae	
Ambrosia	salsola		cheesebush	Asteraceae	
Ambrosia	dumosa		white bur-sage	Asteraceae	
Amsinkia	tessellata	var. tessellata	devil's lettuce	Boraginaceae	
Antirrhinum	filipes		twining snapdragon	Scrophulariaceae	
Aristida	purpurea	var. nealleyi	three-awn	Poaceae	
Astragalus	didymocarpsu	var. dispermus	two-seeded milkvetch	Fabaceae	
Atriplex	canescens	ssp. canescens	four-wing saltbush	Chenopodiaceae	
Baccharis	brachyphylla		shortleaf baccharis	Asteraceae	
Baileya	pleniradiata		woolly marigold	Asteraceae	
Bebbia	juncea		sweetbush	Asteraceae	
Brassica	tournefortii		Sahara mustard	Cruciferae	Non-native
Brickellia	incana		Wolly bursage	Asteraceae	
Brickellia	desertorum			Asteraceae	
Bromus	madritensis	ssp. rubens	red brome	Poaceae	Non-native
Bromus	tectorum		June grass	Poaceae	Non-native
Camissonia	boothii		Booth's evening primrose	Onagraceae	
Camissonia	brevipes		yellow cups	Onagraceae	
Camissonia	chamaeneroides		long fruit suncup	Onagraceae	
Camissonia	claviformis		brown-eyed primrose	Onagraceae	
Camissonia	refracta		narrow-leafed suncup	Onagraceae	
Caulanthus	cooperi		Cooper's jewelflower	Brassicaceae	
Chaenactis	steviodes		Steve's pincusions	Asteraceae	
Chaenactis	carphoclinia		pebble pincushion	Asteraceae	
Chaenactis	fremontii		Fermont's pincushion	Asteraceae	
Chamaesyce	albomarginata		rattlesnake weekd	Euphorbiaceae	
Chorizanthe	brevicornu		brittle spineflower	Polygonaceae	
Chorizanthe	rigida		rigid spineflower	Polygonaceae	
Chrysothamnus	paniculatus		Black-banded rabbitbrush	Asteraceae	
Coleogyne	ramosissima		Blackbrush	Rosaceae	
Cryptantha	angustifolia		Panamint cryptantha	Boraginaceae	
Cryptantha	circumscissa		cushion cryptantha	Boraginaceae	
Cryptantha	dumetorum		bushloving cryptantha	Boraginaceae	
Cryptantha	maritima		Guadelupe cryptantha	Boraginaceae	
Cryptantha	micrantha		redroot crytantha	Boraginaceae	
Cryptantha	nevadensis		Nevada cryptantha	Boraginaceae	

Genus	Species	Var./Sp.	Common name	Family	Status
Cryptantha	pterocarya		wing nut cryptantha	Boraginaceae	
Cryptantha	recurvata		curvenut cryptantha	Boraginaceae	
Cucsuta	(denticulata)		dodder	Cuscutaceae	
Cucurbita	palmata		coyote melon	Cucurbitaceae	
Cylindropuntia	acanthocarpa	var. coloradensis	buckhorn cholla	Cactaceae	Cactus
Cylindropuntia	echinocarpa		silver cholla	Cactaceae	Cactus
Cylindropuntia	ramosissima		pencil cholla	Cactaceae	Cactus
Cynanchum	utahense		Utah vine milkweed	Asclepiadaceae	
Cyptogamic crust					
Dalea	mollissima		soft prairie clover	Fabaceae	
Delphinium	parishii		desert lark spur	Ranunculaceae	
Descurainia	pinnata	ssp. glabra	western tansymustard	Brassicaceae	
Descurainia	pinnata	ssp. halictorum	alkali tansymustard	Brassicaceae	
Dithyrea	californica		speckepod	Brassicaceae	
Echinocactus	polycephalus	var. polycepahlus	cottontop	Cactaceae	Cactus
Echinocereus	engelmanii		Calico cactus	Cactaceae	Cactus
Encelia	virginensis		Virgin River encelia	Asteraceae	
Ephedra	funerea		Death Valley jointfir	Ephedraceae	
Ephedra	viridis		Green ephedra	Ephedraceae	
Eriastrum	eremicum		Desert wolly star	Polemoniaceae	
Ericameria	cooperi		Cooper goldenbush	Asteraceae	
Eriogonum	angulosum		Anglestem buckwheat	Polygonaceae	
Eriogonum	deflexum	var. deflexum	skeleton weed	Polygonaceae	
Eriogonum	fasciculatum	ssp. polifolium	eastern Mojave buckwheat	Polygonaceae	
Eriogonum	inflatum	var. inflatum	desert trumpet	Polygonaceae	
Eriogonum	palmerianum		Palmer's buckwheat	Polygonaceae	
Eriogonum	reniforme		kidneyleaved buckwheat	Polygonaceae	
Eriogonum	thomasii		Thomas' buckwheat	Polygonaceae	
Eriogonum	trichopes		little desert buckwheat	Polygonaceae	
Eriogonum	nidularium		birdnest buckwheat	Polygonaceae	
Eriogonum	thruberi		Thurber's buckwheat	Polygonaceae	
Erioneuron	pulchellum		fluffgrass	Poaceae	
Eriophyllum	wallacei		Wallace's wooly daisy	Asteraceae	
Erodium	cicutarium		filaree	Geraniaceae	Non-native
Eschscholzia	glyptosperma		desert gold poppy	Papaveraceae	
Eschscholzia	minutiflora		small flowered desert poppy	Papaveraceae	
Eucrypta	micrantha		desert eucrypta	Hydrophyllaceae	
Ferocactus	cylindraceus	var. lecontei	barrelcactus	Cactaceae	Cactus
Filago	depressa		dwarf conttonrose	Asclepiadaceae	
Geraea	canescens		Desert sunflower	Polemoniaceae	
Gilia	scopulorum		rock gilia	Polemoniaceae	
Gilia	cana	ssp. speciformis	showy gilia	Polemoniaceae	
Gilia	stellata		star gilia	Polemoniaceae	
Gilia	sp			Polemoniaceae	

Genus	Species	Var./Sp.	Common name	Family	Status
Gilia	brecciarum		Nevada gilia	Polemoniaceae	
Grayia	spinosa		spiny hopsage	Chenopodiaceae	
Grusonia	parishii		matted cholla	Cactaceae	Cactus
Gutierrezea	sarothae		common snakeweed	Asteraceae	
Krameria	erecta		white rhatany	Krameriaceae	
Krascheninnikovia	lanata		winterfat	Chenopodiaceae	
Langloisia	setosissima	ssp. punctata	lilac sunbonnet	Polemoniaceae	
Langloisia	setosissima	ssp. setosissima	Great Basin sunbonnet	Polemoniaceae	
Larrea	tridentata		creosote bush	Zygophyllaceae	
Lepidium	fremontii	var. fremontii	desert peppergrass	Brassicaceae	
Lepidium	densiflorum		Common peppergrass	Brassicaceae	
Lepidium	lasiocarpum	var. lasiocarpum	shaggyfruit pepperweed	Brassicaceae	
Linanthus	aureus		golden gilia	Polemoniaceae	
Linanthus	jonesii		Jones' linanthus	Polemoniaceae	
Loeseliastrum	schottii		Schott's calico	Polemoniaceae	
Lupinus	brevicaulis		Sand lupine	Fabaceae	
Lupinus	concinnus		elegant lupine	Fabaceae	
Lycium	andersonii		Anderson's desert thorn	Solanaceae	
Lycium	cooperi		Cooper's boxthorn	Solanaceae	
Malacothrix	glabrata		desert dandylion	Asteraceae	
Malacothrix	coulteri		Coulter’s dandelion	Asteraceae	
Mammillaria	tetrancistra		fishhook cactus	Cactaceae	Cactus
Menodora	spinescens		spiny desert olive	Oleaceae	
Mentzelia	albicaulis		whitestem blazing star	Loasaceae	
Mirabilis	bigelovii		wishbone plant	Nyctaginaceae	
Monoptilon	belliodes		Mojave desert star	Asteraceae	
Muhlenbergia	porteri		Porter's bush muhly	Poaceae	
Nemacladus	sp. unknown			Campanulaceae	
Nemacladus	sigmoideus			Campanulaceae	
Nemacladus	orientalis		glandular threadplant	Campanulaceae	
Nicotiana	obtusifolia		desert tobacco	Solanaceae	
Oenothera	primaveris	ssp. bufonis	desert evening primrose	Onagraceae	
Opuntia	acanthocarpa	var. coloradensis	buckhorn cholla	Cactaceae	Cactus
Opuntia	basilaris	var. basilaris	beavertail	Cactaceae	Cactus
Opuntia	echinocarpa		silver cholla	Cactaceae	Cactus
Opuntia	erinacea	var. erinacea	Mojave prickleypear	Cactaceae	Cactus
Opuntia	ramosissima		pencil cholla	Cactaceae	Cactus
Orobanche	cooperi		Cooper's broomrape	Orobanchaceae	
Oxytheca	perfoliata		roundleaf puncturebract	Polygonaceae	
Pectocarya	heterocarpa		chuckwlla pectocarya	Boraginaceae	
Pectocarya	penincillata			Boraginaceae	
Pectocarya	platycarpa		broadfruit combseed	Boraginaceae	
Pectocarya	recurvata			Boraginaceae	
Penstemon	albomarginata		white-margined beardtongue	Scrophulariaceae	

Genus	Species	Var./Sp.	Common name	Family	Status
Penstemon	palmeri	var. palmeri	Palmer's penstemon	Scrophulariaceae	
Penstemon	bicolor		Two-color beardtongue	Scrophulariaceae	
Phacelia	crenulata		ntoch-leafed phacelia	Hydrophyllaceae	
Phacelia	fremontii		Fremont's phacelia	Hydrophyllaceae	
Phoradendron	californicum		desert mistletoe	Visaceae	
Physalis	crassifolia		ground cherry	Solanaceae	
Plagiobothrys	jonesii		Jone's popcorn flower	Boraginaceae	
Plantago	ovata		desert plantain	Plantaginaceae	
Pleuraphis	rigida		galleta grass	Poaceae	
Porophyllum	gracile		odora	Asteraceae	
Prenanthella	exigua		brightwhite	Asteraceae	
Psilostrophe	cooperi		paperflower	Asteraceae	
Rafinesquia	neomexicana		desert chicory	Asteraceae	
Salazaria	mexicana		paperbag bush	Lamiaceae	
Salsola	tragus		Russian thistle	Chenopodiaceae	Non-native
Salvia	mohavensis		Mojave sage	Lamiaceae	
Salvia	columbariae		chia	Lamiaceae	
Schismus	arabicus		matted cholla	Poaceae	Non-native
Schismus	barbatus		Mediterranean grass	Poaceae	Non-native
Sphaeralcea	ambigua		desert globemallow	Malvaceae	
Stephanomeria	exigua		Small wirelettuce	Asteraceae	
Stephanomeria	pauciflora		wirelettuce	Asteraceae	
Streptanthella	longirostris		longbeak streptanthella	Brassicaceae	
Stylocline	micropoides		woollyhead neststraw	Asteraceae	
Tiquilia	plicata		fanleaf crinklemat	Boraginaceae	
Viguiera	parishii		Parish's goldeneye	Asteraceae	
Vulpia	octoflora	var. octoflora	six weeks fescue	Poaceae	
Xylorhiza	tortifolia	var. tortifolia	Mojave aster	Asteraceae	
Yucca	schidigera		Mojave yucca	Liliaceae	

APPENDIX C
Wildlife Species Detected

Common Name	Scientific Name	Sign
Birds		
Ash-throated Flycatcher	*Myiarchus cinerascens*	O,V
Barn Swallow	*Hirundo rustica*	O
Black-headed Grosbeak	*Pheucticus melanocephalus*	O,V
Black-tailed Gnatcatcher	*Polioptila melanura*	O,V
Black-throated Sparrow	*Amphispiza bilineata*	O,V
Blue-gray Gnatcatcher	*Polioptila caerulea*	O,V
Brewer's Sparrow	*Spizella breweri*	O
Burrowing Owl	*Athene cunicularia*	O, S, F
Cactus Wren	*Campylorhynchus brunneicapillus*	O,V
Cliff Swallow	*Petrochelidon pyrrhonota*	O
Common Poorwill	*Phalaenoptilus nuttallii*	O
Common Raven	*Corvus corax*	O,V, N
Crissal Thrasher	*Toxostoma crissale*	O
Gambel's Quail	*Callipepla gambelii*	O,V
Golden Eagle	*Aquila chrysaetos*	O
Greater Roadrunner	*Geococcyx californianus*	O
Horned Lark	*Eremophila alpestris*	O,V
Le Conte's Thrasher	*Toxostoma lecontei*	O,V
Lesser Nighthawk	*Chordeiles acutipennis*	O
Loggerhead Shrike	*Lanius ludovicianus*	O,V
Mourning Dove	*Zenaida macroura*	O,V
Phainopepla	*Phainopepla nitens*	O,V
Prairie Falcon	*Falco mexicanus*	O,V, N
Red-tailed Hawk	*Buteo jamaicensis*	O,V, N
Sage Thrasher	*Oreoscoptes montanus*	O,V
Scott's Oriole	*Icterus parisorum*	O
Townsend’s Warbler	*Townsend’s Warbler*	O
Turkey Vulture	*Cathartes aura*	O
Verdin	*Auriparus flaviceps*	O
Western Kingbird	*Tyrannus verticalis*	O,V
Western Meadowlark	*Sturnella neglecta*	O,V
Western Tanager	*Piranga ludoviciana*	O
White-crowned Sparrow	*Zonotrichia leucophrys*	O,V
White-throated Swift	*Aeronautes saxatalis*	O
Wilson's Warbler	*Wilsonia pusilla*	O
Yellow-headed Black bird	*Xanthocephalus xanthocephalus*	O
Reptiles		
Desert Tortoise	*Gopherus agassizii*	O,B, T, S, C
Coachwhip	*Masticophis flagellum*	O
Desert Horned Lizard	*Phrynosoma platyrhinos*	O, S

Common Name	Scientific Name	Sign
Desert Iguana	*Dipsosaurus dorsalis*	O, S
Gopher Snake	*Pituophis melanoleucus*	O
Long-nosed Leopard Lizard	*Gambelia wislizenii*	O
Side-blotched Lizard	*Uta stansburiana*	O
Speckled Rattlesnake	*Crotalus mitchelli*	O
Western Patch-nosed Snake	*Salvadora hexalepis*	O
Western Shovel-nosed Snake	*Chionactis occipitalis*	O
Western Whiptail	*Cnemidophorus tigris*	O
Zebra-tailed Lizard	*Callisaurus draconoides*	O
Mammals		
Black-tailed Jackrabbit	*Lepus californicus*	O, T, S
Coyote	*Canis latrans*	T, S, B
Desert Cottontail	*Sylvilagus audubonii*	O, T, S, B
Desert Kit Fox	*Vulpes macrotis arsipus*	B, T, S
Desert Woodrat	*Neotoma lepida*	O, B
White-tailed Antelope Ground Squirrel	*Ammospermophilus leucurus*	O

O – Observed Directly
B – Burrow
T – Tracks
V – Vocalization
S – Scat
C – Carcass

SUPPLEMENTAL BIOLOGICAL ASSESSMENT
SILVER STATE SOLAR SOUTH PROJECT
BLM CASE FILE N-85077

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June 30, 2013

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List of Acronyms

ACEC	Area of Critical Environmental Concern
Applicants	Silver State Solar Power South, LLC (Silver State) and Southern California Edison (SCE)
BA	Biological Assessment
BLM	U.S. Bureau of Land Management
BO	Biological Opinion
CHU	Critical Habitat Unit
DWMA	Desert Wildlife Management Area
EIS	Environmental Impact Statement
ESA	Endangered Species Act
I-15	Interstate 15
LSTS	Large-Scale Translocation Site
MW	Megawatt Alternating Current
NEPA	National Environmental Policy Act
O&M	Operations and Maintenance
PV	Photovoltaic
ROD	Record of Decision
ROW	Right of Way
SCE	Southern California Edison
Service	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

1.0 Background

This Supplemental Biological Assessment (BA) is submitted to provide additional information regarding project site changes as part of formal consultation between the Bureau of Land Management (BLM) and the Fish and Wildlife Service (Service) under Section 7 of the federal Endangered Species Act (ESA) for the proposed action of granting a Right-of-Way (ROW) on federally-managed lands to Silver State Solar Power South, LLC (Applicant) for the Silver State Solar South Project. The Draft Supplemental Environmental Impact Statement associated with the project analyzes various alternatives for a 350 megawatt alternating current (MW) solar photovoltaic power plant. This BA sets forth a reduced size 250 MW alternative developed by the Applicant and BLM in response to comments from the public and government agencies and is intended by BLM to be the Preferred Alternative identified in the Final Supplemental Environmental Impact Statement. This new alternative is called Alternative E (hereinafter the "Project" or "Proposed Action").

The Project is a 250 MW solar photovoltaic power plant and has components to be constructed, owned and operated by two separate entities: (1) the photovoltaic (PV) solar field and associated facilities, a substation and a 220-kilovolt interconnection transmission line (gen-tie line) to be constructed, owned and operated by the Applicant; and (2) a switchyard and related facilities (loop-in lines, telecommunications site, microwave site, fiber optic installation and separate access road) to be constructed, owned and operated by Southern California Edison (SCE). When discussed together, these entities are referred to as the Applicants. BLM requests separate incidental take statements for these two separate components and entities.

One species and its critical habitat are presented here for formal consultation under Section 7 of the federal ESA, the Mojave desert tortoise (Table 1). The Mojave population of desert tortoise (*Gopherus agassizii*) was listed as threatened under the Federal ESA in 1990. This species was present during field surveys of the Action Area, and BLM has determined that the actions associated with the Proposed Action may affect and are likely to adversely affect this species. BLM has determined that the Proposed Action is not likely to adversely affect and will not adversely modify designated critical habitat for the desert tortoise.

Table 1 Consultation Species and Critical Habitat

Species/Habitat	Listing Status	Determination
Mojave desert tortoise (*Gopherus agassizii*)	Threatened	May affect, likely to adversely affect
Critical Habitat for the Mojave desert tortoise	Designated	Not likely to adversely modify designated critical habitat

1.1 Project History and Scope of Reinitiated Consultation

On September 16, 2010, the Service issued the 2010 Biological Opinion (2010 BO) encompassing three phases of the proposed 400 MW Silver State Solar Project, and an Incidental Take Statement associated with the anticipated take of desert tortoise for all three phases of the 400 MW project.

On October 12, 2010, following issuance of a Final Environmental Impacts Statement (EIS) for the 400 MW project, the BLM issued a Record of Decision (ROD) approving Phase I (50 MW) and indicating that subsequent Phases II and III (350 MW combined) may require supplemental analysis under the National Environmental Policy Act (NEPA). BLM incorporated the 2010 BO as a term and condition of the ROW grant for Phase I, which is referred to as the Silver State North Project, and which is independently owned by Silver State Solar Power North, LLC. In May 2012, Silver State Solar Power North, LLC completed construction and the required testing and commissioning steps to achieve commercial operation of the Silver State North Project.

The scope of this BA is to address the potential impacts of the Proposed Action on desert tortoise for those aspects of the Proposed Action that differ from those considered and approved in the 2010 BO. This consultation does not involve or address the Silver State Solar North Project (Phase I in the 2010 ROD) because construction of that project is now complete and it is in operation. Because the Silver State Solar North project is encompassed by the 2010 BO, however, any revised or amended Biological Opinion should clearly and separately set forth the take requirements for the Silver State Solar North Project contained in the "Operation and Maintenance of Project Facilities" and "Restoration and Decommissioning of Facilities" provisions set forth in Sections A.3 and A.4 of the Incidental Take Statement in the 2010 BO (pages 52-53).

This BA incorporates information from the following documents by reference:

- *2010 Biological Assessment, Silver State Solar* (BLM and CH2M Hill 2010) – detailed descriptions of construction methods, affected environment and cumulative project discussion.
- *2010 Biological Opinion for the Silver State Solar Project*, File No. 84320-2010-F-0208 (Service 2010b) - detailed descriptions of construction methods, affected environment and cumulative project discussion.
- *2010 Final Environmental Impact Statement for the Silver State Solar Energy Project* (BLM 2010) - detailed descriptions of construction methods and discussions of affected environment and impacts where project changes did not occur
- *Plan of Development, Silver State Solar South Project* (CH2M Hill 2011) – detailed descriptions of construction methods
- *Biological Resources Technical Report, Silver State Solar South* (Ironwood 2012a) – biological surveys and results.
- *Draft Supplemental Environmental Impact Statement for the Silver State Solar South Project and Proposed Las Vegas Field Office Resource Management Plan Amendment* (BLM 2012) Updated descriptions of construction methods, applicant measures, mitigation measures, and updated discussions of affected environment and impacts.
- *Primm Project Technical Description* (SCE 2013) – detailed project description (including operations and maintenance), and maps of SCE facilities.

This BA has been prepared in accordance with legal requirements contained in Section 7 of the ESA (16 U.S.C. § 1536(c)), and adheres to the standards established in the *Endangered Species Consultation Handbook* (Service 1998) and *Desert Tortoise Field Manual* (Service 2009c). Pursuant to 50 C.F.R. § 402.16(c) and the terms of the 2010 BO, the re-initiation of consultation under Section 7 is required where, among other things, "the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion." As the lead federal agency, BLM will oversee compliance with laws, ordinances, regulations, and standards required for the proposed project, as well as conservation and mitigation measures.

1.2 Consultation History

Meetings have been held with personnel from the Service, BLM, and the Applicant in attendance in order to work on Project siting and on avoidance, minimization and mitigation measures. The Project presented in this document is the result of these meetings, which have included the following:

July 31 2012	Bob Ross, Gayle Marrs-Smith, Greg Helseth, Mark Slaughter, and Erika Schumacher of the BLM Las Vegas Field Office met with representatives of the Applicant Ken Borngrebe and Linda Bullen at BLM's Las Vegas Field Office to provide direction on the form and content of information required for the re-initiation of consultation on the 2010 BO.
October 10 2012	Ted Koch, Roy Averill-Murray, Kim Field, Jana Affonso, Leilani Takano, and Brian Novosak of the Service met with representatives of the Applicant, Ken Borngrebe, Scott Dawson, Linda Bullen, David Lazerwitz, Chris Blandford, and Kathy Simon at the Service Office in Reno, NV, to discuss the proposed project, as well as sections of the 1994 Desert Tortoise Recovery Plan and translocation guidelines.
May 21 2013	Raul Morales, Bob Ross and Gail Marrs Smith of the BLM NV and Tom Pogacnik and Amy Fesnock of BLM California; and Michael Senn, Mike Fris, Ray Bransfield, and Rachel Henry of the Service met with representatives of the Applicant, Michael Hatfield, Mike Argentine, Robert Holbrook, Beth Deane, Scott Dawson, Gordon Hart, Peter Weiner, Linda Bullen, David Lazerwitz, Chris Blandford, and Kathy Simon at the BLM and Service's Office in Sacramento, CA to introduce a new project team from the Service and discuss the layout of the proposed project.
June 6 2013	Amy Leuders, Raul Morales, Patrick Gubbins, Sandra Brewer, Mark Slaughter of the BLM NV; and Alex Pitts, Mike Fris, and Rachel Henry of the Service met with representatives of the Applicant, Mike Hatfield, Ken Borngrebe, Robert Holbrook, and Peter Weiner at the Service Office in Reno, NV to review the proposed revised layout for the Project.

2.0 Description of the Proposed Action

The Proposed Action is the BLM's issuance of a ROW grant for the Silver State Solar South Project that would authorize construction, operation, maintenance, and decommissioning of a commercial solar power-generating facility on a maximum of 2,427 acres of BLM-managed lands.

2.1 Project Location

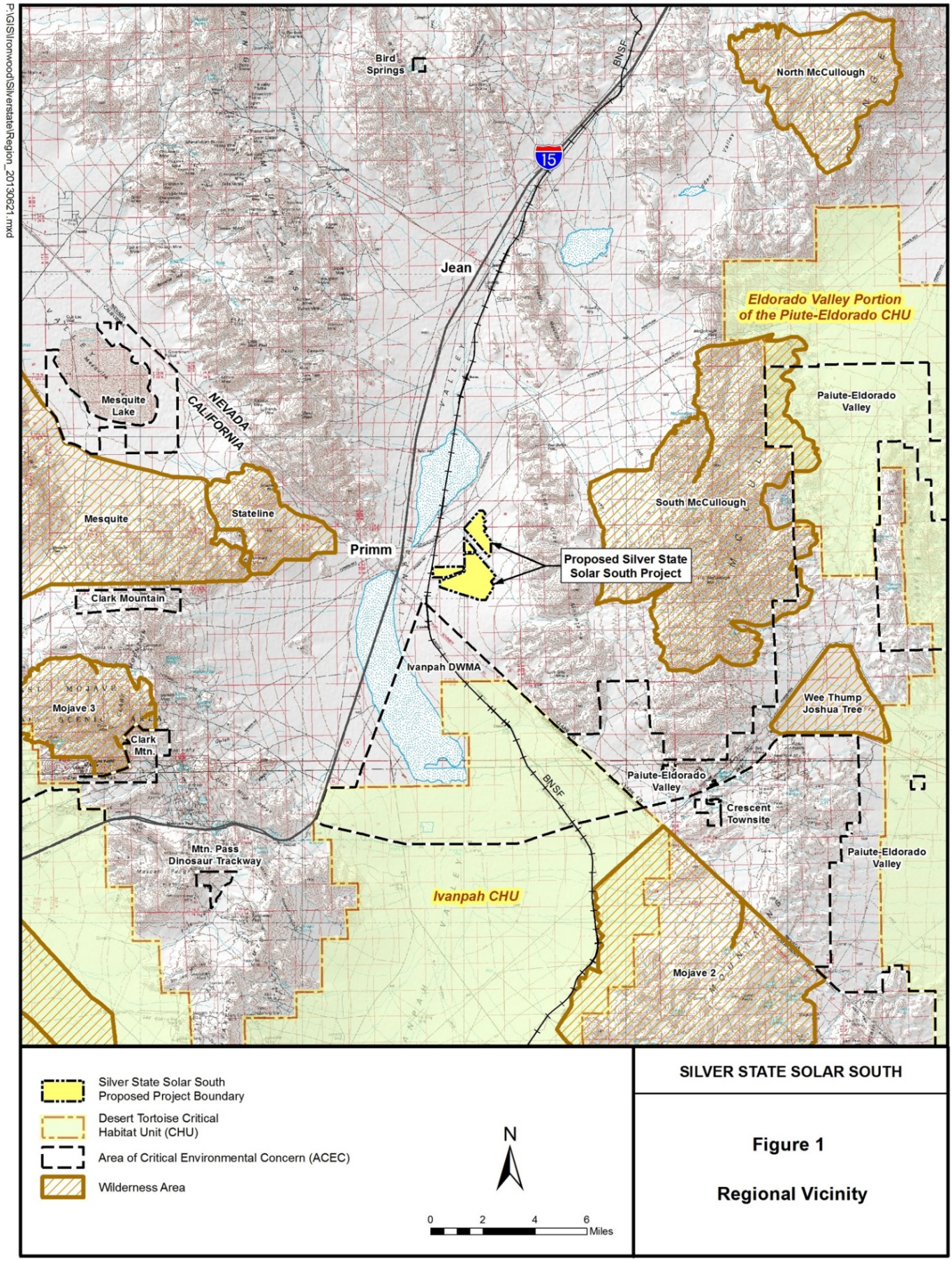
The Project is located in unincorporated Clark County within the northern Ivanpah Valley, less than one mile east of Primm, Nevada, and is located outside the boundaries of an Area of Critical Environmental Concern (ACEC), Desert Wildlife Management Area (DWMA), Wilderness Area, or Service designated critical habitat unit (CHU) for desert tortoise (Figure 1). The site is located east of Interstate 15 and Roach Lake and can be found on the Desert and Roach 7.5-Minute U.S. Geological Survey (USGS) topographic quadrangles (Figure 2). The Project lies between the Lucy Gray Mountains and Roach Dry Lake. Existing developed areas within the immediate vicinity of the Project site are associated with linear features that cross and dissect the Ivanpah Valley including interstate 15 (I-15), Union Pacific Railroad, numerous overhead transmission lines and associated dirt roads, an underground petroleum line and associated dirt roads, and off-highway vehicle roads and race routes. Other existing developments within the immediate vicinity of the Project site include Primm (casinos, outlet mall, staff housing and support facilities), Nevada Energy Walter M. Higgins Generation Station and the Silver State Solar North Project.

2.2 Summary of Project Impacts

Table 2 summarizes the number of acres of temporary and permanent disturbance associated with the Project for both Silver State and SCE.

Table 2 Disturbance Acreages

Project Component	Permanent Disturbance	Temporary Disturbance
Silver State		
Inside perimeter and desert tortoise fence PV Array Area – includes PV field, internal roads, and laydown yard	1,898	28
Outside facility fence - drainage features	374	-
Outside facility fence - Access roads and gen-tie line	86	7
Subtotal Silver State		*2,393*
SCE Components		
Inside fence or walled area SCE Primm Switchyard, new access roads, and telecom site	28	-
Outside facility fence SCE new road/tower buffers and material and equipment staging areas	2	4
Subtotal SCE		34
Total		**2,427**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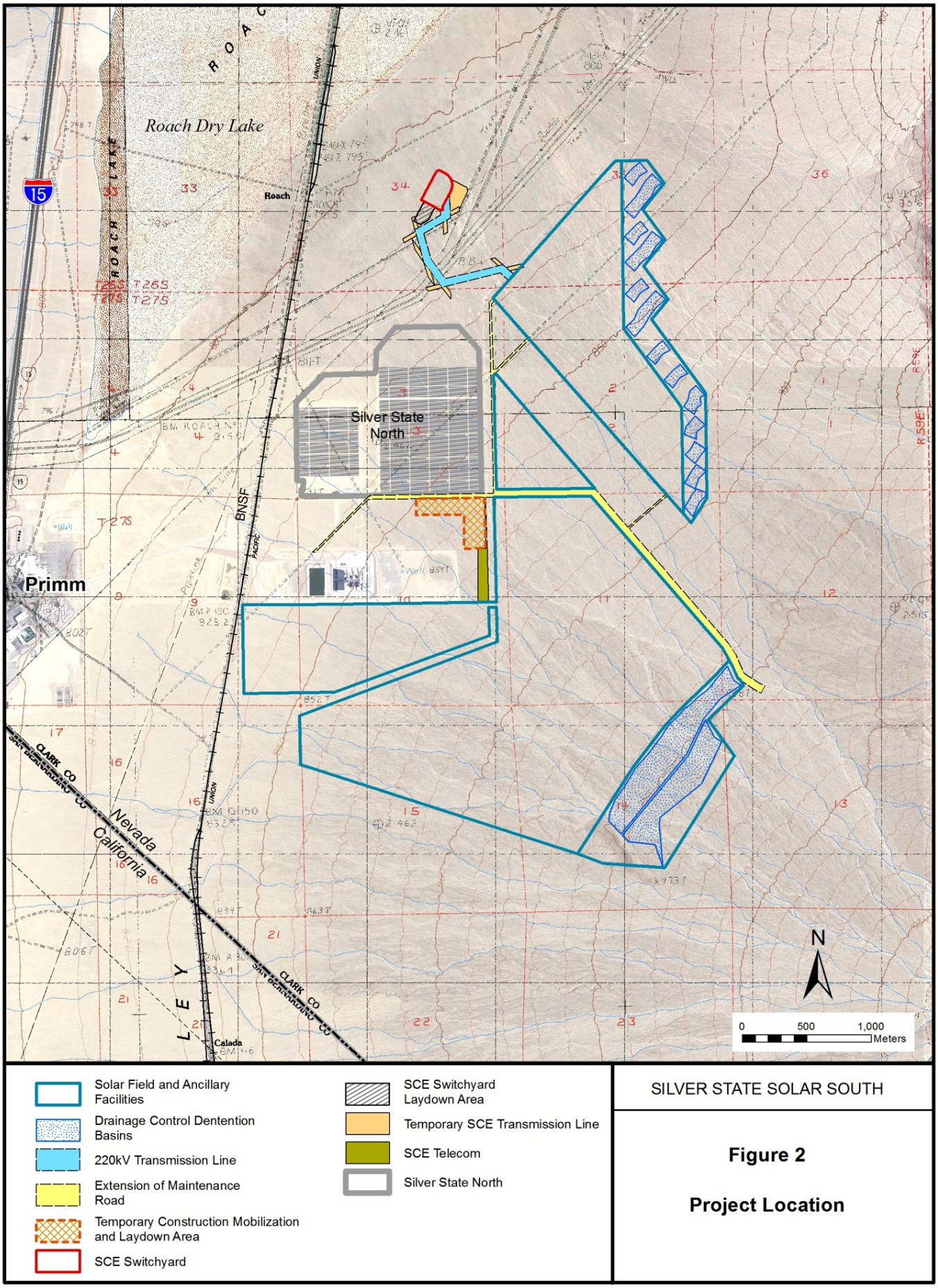
Bird Springs
BNSF
North McCullough
15
Jean
Eldorado Valley Portion of the Piute-Eldorado CHU
Paiute-Eldorado Valley
Mesquite Lake
NEVADA
CALIFORNIA
Mesquite
Stateline
South McCullough
Primm
Proposed Silver State Solar South Project
Clark Mountain
Ivanpah DWMA
Mojave 3
Clark Mtn.
Wee Thump Joshua Tree
Paiute-Eldorado Valley
Crescent Townsite
BNSF
Mtn. Pass Dinosaur Trackway
Ivanpah CHU
Paiute-Eldorado Valley
Mojave 2
Silver State Solar South Proposed Project Boundary
Desert Tortoise Critical Habitat Unit (CHU)
Area of Critical Environmental Concern (ACEC)
Wilderness Area
N
0 2 4 6 Miles
SILVER STATE SOLAR SOUTH
Figure 1
Regional Vicinity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Roach Dry Lake
ROACH LAKE
Roach
Silver State North
BNSF
Primm
Nevada
California
CLARK CO
SAN BERNARDINO CO
Calada
N
0
500
1,000
Meters
Solar Field and Ancillary Facilities
Drainage Control Dentention Basins
220kV Transmission Line
Extension of Maintenance Road
Temporary Construction Mobilization and Laydown Area
SCE Switchyard
SCE Switchyard Laydown Area
Temporary SCE Transmission Line
SCE Telecom
Silver State North
SILVER STATE SOLAR SOUTH
Figure 2
Project Location

3.0 Construction Activities and Timeline

The construction of the Project would commence after all applicable approvals and permits have been obtained, which is expected to be no sooner than October 2013. Project construction is expected to take approximately 36 months from the commencement of the construction process to commercial operation. Construction would commence with activities such as linear fencing, well drilling and geotechnical sampling, with initial tortoise clearance activities starting in either October 2013 or April 2014 depending on timing and tortoise activity in the immediate Project area.

The documents referenced in Section 1.1 of this BA discuss the construction of the Project in detail, including Construction, Operations and Maintenance (O&M) and Decommissioning stages of the Project. A summary of construction information is provided here.

3.1 Construction

3.1.1 Silver State

Construction Activities and Sequence

Major construction activities include:

1. Environmental clearances and tortoise fence installation
2. Preparation of the site access and temporary laydown areas
3. Construction of on-site water wells and temporary water storage ponds, drainage facilities and maintenance roads
4. Solar field site preparation and application of dust palliative for dust suppression - BLM in coordination with the Service is assessing several dust palliatives for experimental use. First Solar has been contacted and is being considered for an experimental application that would include a study to look at how palliatives move through the project site during rain events (See Section 4.2 for related compensatory mitigation).
5. Construction of the solar field substation and gen-tie line
6. Construction of the SCE switchyard and related facilities (by SCE)
7. Installation of the PV equipment
    a. Prepare trenches for underground cable and install underground cable
    b. Backfill trenches
    c. Install steel posts and table frames and/or tracker systems, and install PV modules
    d. Install concrete footings for inverters, transformers, and substation equipment
    e. Install inverter and transformer equipment
    f. Install internal power collection system
    g. Install weather monitoring stations
    h. Perform electrical terminations
    i. Inspect, test, and commission equipment
8. Energize solar facility/begin commercial operation

Construction and Clearance Timeline

Construction would be completed in sections so that desert tortoise clearance can be completed during active months (approximately April-May and September-October). If initial fencing or other linear activities are completed outside active months, these activities will be monitored and any potentially-active tortoise burrows would be avoided or scoped before excavation to ensure no animals were present in the burrow. Additional details, including specific disposition location for each known adult animal that might be translocated, are provided in the *Desert Tortoise Translocation Plan for Silver State Solar South*, Appendix A.

Each area to be constructed would be divided into sections of approximately 700 acres. If it is suspected that a section may not support desert tortoise based on surveys and tortoise-tracking data, clearance surveys may be conducted in the non-active season and construction could commence if there was no active tortoise sign (including live animals, active burrows, recent scat, mating rings, recent nests, etc) found within that fenced area. This would only apply to areas in the extreme western part of the project between Silver State North and the Higgins Generating Station and south of the Higgins Generating Station where no active desert tortoise sign has been found in numerous surveys or after nearly a year of tracking transmittered animals in the area. If any active desert tortoise sign (i.e., live animals, recently used burrows, or scat) is found during these clearance surveys, the survey will be halted and resumed during the following active season. No construction would occur in that area until clearance was completed in the following active season.

Other Project areas may be fenced during the inactive seasons but clearance surveys will only occur during active seasons. A clearance survey will not be completed until no new active desert tortoise sign is found on at least two full survey passes during a full coverage survey using 5-meter transects.

<u>October – December 2013</u>

The temporary construction and mobilization laydown area (see Figure 2) would be constructed first with fencing occurring as early as October 2013. The area south of the Higgins Generating Station would be fenced next. Either or both of these areas would be cleared in October 2013 if BLM Notice to Proceed is issued in with enough time to perform clearance surveys. Fencing of additional areas in Phase II may also occur during this period. Other linear project components such as fencing, transmission structures and related linear components may be completed during this period.

<u>January-March 2014</u>

No additional areas would be cleared for desert tortoise during these months. Linear project components such as fencing, transmission structures and related linear components may be completed during this period.

<u>April 2014-May 2014</u>

The remainder of the Project site would be fenced and cleared either during this period or in September and October 2014 depending on weather conditions and construction schedules. All adult tortoises found would be either already transmittered from previous studies, or would be transmittered at this

time. If the winter of 2013-2014 provides for good annual plant production and relatively cool temperatures, these animals may be translocated in this time period in accordance with the Project's *Desert Tortoise Translocation Plan for Silver State Solar South* (Appendix A). If Spring 2014 follows a drier than normal winter with poor annual plant production, translocation of these animals would be delayed until Fall 2014. To the extent practicable, all animals would be moved in the Fall to provide them cooler temperatures following translocation.

June-August 2014

No additional areas would be cleared for desert tortoise during these months. Linear project components such as fencing, transmission structures and related linear components may be completed during this period.

September-October 2014

If tortoises were not translocated in Spring 2014, they would be translocated during this period.

All Project clearance is expected to be completed by the end of October 2014.

3.1.2 Construction – SCE

Clearance surveys may also be attempted on SCE components during the inactive season in the same manner discussed above for Silver State South components. Additional changes to SCE components from the 2010 BA include the following (SCE 2013):

- Not all areas of temporary impacts would be compacted. Laydown/construction areas for transmission structures would not be compacted.
- Permanent impact areas within the switchyard will be compacted and covered with a base of 4 to 6 inches of rock base.
- Vehicle parking will be within monitor-approved areas that are designated and marked, but may be within unfenced temporary impact areas.

3.2 Operation and Maintenance

No heavy equipment would be used during plant operation. Periodic routine maintenance would include monthly, quarterly, semi-annual and annual inspections and service. Operation and maintenance would require the use of vehicles and equipment such as pickup trucks, crane trucks, forklifts, and chemical application equipment for weed abatement, if required (See Noxious Weed Management Plan, Appendix C). Pest control may also be required, including control of rodents and insects inside of the O&M building and electrical equipment enclosures (See Pesticide Use Proposal in Appendix D). Detention basin maintenance will be required depending on the frequency and magnitude of rainfall and agreements with the Clark County Regional Flood Control District. Roads will also need to be maintained, including regarding and application of dust palliatives as necessary. At designated intervals, approximately every ten to fifteen years, major equipment maintenance would be performed. SCE will separately operate and maintain the switchyard and related facilities (discussed in further detail in SCE May 10, 2013 Primm Project Technical Description).

3.3 Decommissioning

The economic lifespan of the Project components is expected to be in the range of 20 to 30 years, depending upon the availability of agreements with utilities. At the end of the Project's useful economic life, the facilities would either be re-powered under a new authorization or decommissioned with the following goals:

- Remove above-ground structures; and
- Restore the contour lines and grades in the disturbed area of the Project area to the extent practicable in order to generally match the natural gradient of the site, and re-establish native vegetation and soils in disturbed areas to the extent practicable.

As described in the 2010 BA, SCE Project components decommissioning will depend on the expected future use of the site. Some equipment associated with the Primm Switchyard and other SCE facilities may be used for future uses. This may include O&M buildings, switchyard, transmission lines and poles and access roads. The details of decommissioning will be determined at the time of the action under an BLM-approved Decommissioning Plan.

4.0 Minimization Measures and Compensatory Mitigation

4.1 Minimization Measures

The following measures were drafted by the Service for the Project. To minimize adverse effects to the desert tortoise, BLM will ensure the Applicants implement the following protective measures during construction, O&M, and decommissioning activities. SCE will be separately responsible for these requirements on their project components. These measures supersede those set forth in the 2010 BA (BLM 2010) and BO (Service 2010b).

Additional management plans to be submitted to the BLM as part of these measures, including:

- *Raven Management Plan* (Appendix B)
- *Weed Management Plan* (Appendix C)
- *Pesticide Use Proposal* (PUP, Appendix D)

1. The Applicants will employ authorized biologists, approved by the Service, and desert tortoise monitors to ensure compliance with protective measures for the desert tortoise. Use of authorized biologists and desert tortoise monitors will be in accordance with the most up-to-date Service guidance and will be required for monitoring of any construction, operation, or maintenance activities that may result in take of the desert tortoise. The current guidance is entitled *Desert Tortoise – Authorized Biologist and Monitor Responsibilities and Qualifications* (Service 2008a).
2. The Applicants will provide the credentials of all individuals seeking approval as authorized biologists to the Bureau. The Bureau will review these and provide the credentials of appropriate individuals to the Service for approval at least 30 days prior to the time they must be in the field.
3. The Applicants will designate a Field Contact Representative (FCR) who will oversee compliance with protective measures during construction, O&M, and decommissioning activities that may result in injury or mortality of desert tortoises. If the FCR, authorized biologist, or desert tortoise monitor identifies a violation of the desert tortoise protective measures, they will halt work until the violation is corrected.
4. Authorized biologists and qualified desert tortoise monitors will capture and handle desert tortoises in compliance with the most up-to-date guidance from the Service. The Service is currently using the *Desert Tortoise Field Manual* (Service 2009).
5. The Applicants will develop and implement an environmental awareness program for all workers (construction, operation, maintenance, and decommissioning) that will address the following: a) types of construction activities that may affect the desert tortoise, b) the required desert tortoise protective measures, c) desert tortoise life history and threats, d) legal protections and penalties, and e) reporting requirements.
6. The Applicants will fence the boundaries of the project site, and clear these areas of all desert tortoises prior to construction. Access roads will either be permanently fenced, temporarily fenced during construction, or monitored during periods of high traffic, based on approval of BLM and the Service.

7. Authorized biologists will perform clearance surveys of unfenced work areas outside of the main project sites and construction logistics area (e.g., utility right-of way, substation, etc.) immediately prior to the onset of construction, operation, or maintenance activities.

8. The Applicants will employ an appropriate number of authorized biologists and desert tortoise monitors to provide full coverage monitoring of construction, O&M, and decommissioning activities that occur in any unfenced work areas. Authorized biologists or desert tortoise monitors will flag all desert tortoise burrows for avoidance in areas adjacent to construction work areas.

9. The Applicants will confine all construction activities, project vehicles, and equipment within the delineated boundaries of construction areas that authorized biologists or designated desert tortoise monitors have identified and cleared of desert tortoises. The Applicants will confine all work areas to the smallest practical area, considering topography, placement of facilities, location of burrows, public health and safety, and other limiting factors. The Applicants will use previously disturbed areas to the extent feasible.

10. Any non-emergency expansion of activities into areas outside of the areas considered in this biological opinion will require BLM approval and desert tortoise clearance surveys. These expanded activities may require re-initiation of consultation with the Service.

11. The Applicants will prohibit project personnel from driving off road or performing ground-disturbing activities outside of designated areas during construction, O&M, or decommissioning.

12. During O&M activities at the completed project site, The Applicants will confine all vehicle parking, material stockpiles, and construction-related materials to the permanently fenced project sites and construction logistics area.

13. The Applicants will confine project access to one major access road for construction, O&M, and decommissioning of the Project, along an unpaved and unnamed road from the paved Interstate 15 frontage road for construction, operation, maintenance, and decommissioning of Silver State South Solar facility. The Applicants will temporarily fence this road with desert tortoise exclusion fencing prior to the onset of construction and it will remain fenced throughout the construction period, or monitoring will occur along this road during times of heavy construction traffic. To reduce the potential for vehicle strikes of desert tortoise on unfenced access roads (i.e., gas line road, fiber optic right-of-way road, etc.), The Applicants will enforce a 20 mile-per-hour speed limit for project related travel (i.e., construction, operation, maintenance, and decommissioning) in these areas. First Solar will post speed limit signs along all access routes.

14. Project personnel who are working outside fenced areas will check under vehicles or equipment before moving them. If project personnel encounter a desert tortoise, they will contact an authorized biologist. The desert tortoise will be allowed to move a safe distance away prior to moving the vehicle. Alternatively, an authorized biologist or desert tortoise monitor may move the desert tortoise to a safe location to allow for movement of the vehicle.

15. An authorized biologist or desert tortoise monitor will inspect all excavations that are not within desert tortoise exclusion fencing on a regular basis (several times per day) and immediately prior to

filling of the excavation. If project personnel discover a desert tortoise in an open trench, an authorized biologist or desert tortoise monitor will move it to a safe location. The Applicants will cover or temporarily fence excavations that are outside of the permanently fenced project areas at the end of each day to prevent entrapment of desert tortoises during non-work hours.

16. When outside of the fenced project areas, project personnel will not move construction pipes greater than 3 inches in diameter if they are stored less than 8 inches above the ground until they have inspected the pipes to determine the presence of desert tortoises. As an alternative, The Applicants may cap all such structures before storing them outside of fenced area.

4.2 Compensatory Mitigation

In order to help offset any potential adverse effects to localized connectivity, the Project has proposed additional mitigation, including the following:

1. Desert tortoise remuneration fees at $824/acre paid to the BLM – funds from the Project will be located in a separate WBS within the Section 7 account for improving connectivity at the Large-Scale Translocation Site (LSTS) as described below. The total acres of disturbance equal 2,393 for a total fee of $1,971,832. SCE components cover 34 acres for a total fee of $28,016.

2. Fund BLM/Service efforts to assist in re-establishing potential connections in the immediate area of the Project, including:
   a. Health and genetic testing of desert tortoise in the LSTS to determine if restoring connectivity is recommended ($200,000).
   b. Funding restoration of connectivity and protection of connectivity corridors within the ACEC created by the land use amendment associated with the Project. ($700,000).
      1) If testing showed the possibility of restoring these connections, funding would be used for LSTS fence reconfiguration (to open up under-crossings) and cattle guard removal (where necessary) at designated I-15 and railroad under-crossings, as well as fence and culvert installation along Hwy 161 to provide additional connectivity in the local and regional habitat areas. If additional funds are required for this effort, they will come from those funds provided as desert tortoise remuneration fees (If testing in the LSTS shows high disease rate or problems with genetics, restoration of this connectivity would not go forward and associated funding would go toward fencing of Hwy 93).
      2) Funding of restoration ($400,000) and law enforcement ($350,000) to ensure that connectivity areas near the project are improved (restoring roads and trails, etc.) and management actions are enforced for up to three years.

3. Provide funding for a study to inform future projects (TBD). This would be a regional study that would analyze functionality of corridors and connectivity throughout the Ivanpah Valley, and assess how these connections have been affected by human-developments, including the Project.

4. Provide funding to study the effects of dust palliatives, if approved, downstream for their application ($100,000). This study would look at how palliatives move through the project site during rain events. If dust palliative is used for dust control, storm water sampling will be conducted after the first qualifying rain event (enough rain to generate runoff) in each quarter when such a rain event occurs. The storm water will be analyzed for the concentration of chemical components of the dust palliative.

These efforts are likely to provide beneficial effects by removing barriers to tortoise movement in the local and regional habitat areas, removing hazards to animals from cattle guards and drop offs related to erosion at under-crossings, and increasing scientific data and knowledge regarding connectivity for this species that can be used to determine future agency goals for conservation and research.

5.0 Affected Environment

The affected environment has not changed from that presented in the 2010 BA (BLM 2010).

6.0 Status of Species and Habitat

The status of the Mojave desert tortoise and its habitat has not significantly changed from that presented in the 2010 BA (BLM 2010). This section provides baseline conditions of desert tortoise density, disease status, home range/activity areas and connectivity in the Project region.

6.1 Updated Status of Species in the Project Area

During the past three years, the Applicant has funded and undertaken a considerable amount of biological research beyond what has been required for prior projects of a similar type. These studies provide more complete knowledge and establish better baseline data regarding the status of desert tortoise biology and habitat in the Project region. This includes the following research and studies:

1. Full coverage protocol surveys based on the Service's 2010 Pre-Project Field Survey Protocol for over 20,000 acres of land within the ROW application area to better determine desert tortoise densities and distribution in the Project region.
2. Baseline studies of densities of vegetation communities and wildlife communities (small mammals, birds, and reptiles) to better describe existing habitat conditions.
3. Regional expanded modeling and ground-truthing of connectivity potential across possible geographic and development barriers to accurately determine the status of potential and actual desert tortoise connectivity within the region. Range-wide modeling of potential connectivity areas was done base on the 2009 modeling (Nussear 2009) after which more focused modeling and field verification was conducted to determine which pass areas supported both suitable habitat for desert tortoise and lacked geographical barriers to tortoise movement such as cliffs. During this effort all tortoise sign was recoded and this data combined with the verification of potential connectivity locations resulted in the selection of the McCullough and Stateline Pass areas for further research by the USGS into regional genetic connectivity corridors.
4. Field locating and transmittering tortoises to support Applicant-funded USGS research in the McCullough Pass in Nevada and Stateline Pass in California. These USGS studies are co-funded by BLM as an effort to determine levels of genetic contact in these geographically restricted mountain passes.
5. Conducted individual desert tortoise research, pursuant to federal and state permits, directed at analysis of Home Range and Activity Areas, Habitat Association, Disease Proximity Analysis, and Contaminant Analysis. Through this on-going research, 80 individual adult desert tortoises have been located, transmittered, and are being tracked in the immediate Project area. Health assessments were conducted for all of these animals according to Service protocols. All animals have been re-located twice each week during activity periods in Fall 2012 and Spring 2013, were re-located approximately once every month throughout the 2012-2013 winter inactive season; and currently are being tracked once every month in the summer 2013 inactive season. Information gathered from this research effort has informed density estimates with greater confidence, disease status of the regional population prior to Project permitting, and preliminary data on activity areas and localized connectivity potential.

6.2 Density

Estimates for density of desert tortoise within the Project site were derived from full coverage surveys conducted in 2011 and 2012 over the entire site and calculated using the formula in the Service's most recent protocol (Service 2010a), as shown in Table 3. There are currently 43 adult tortoise being tracked with home ranges either within or overlapping the Project site.

Table 3 Desert Tortoise Densities

Project Phase and Size (acres)	Point Estimate (# tortoises)	95% Confidence Interval (# tortoises)	Density Point Estimate (tortoises/mi^2)	Density Range Estimate (tortoises/mi^2)
Phase II (2,427)	44	17 to 115	13	5 to 33

6.3 Disease Status

Through a research permit issued to Danna Hinderle (Service # TE-218901-3, BLM Wildlife Research Permit Case #NV-052-UA-12-08, Nevada Division of Wildlife S35587), baseline disease status of all of the animals located to date within and adjacent to the Project site were determined in 2012 and are shown in Table 4. *Mycoplasma agassizii* tests revealed three suspect titers and no positive results. *Mycoplasma testudinium* tests revealed one strongly positive result in an animal that also showed clinical signs of disease but was negative for *M. agassizii*. Eight individuals or 11% of the tested animals had positive titers for *M. testudinium*, 18 individuals or 25% had suspect titers, and 45 individuals or 63% had negative titers.

6.4 Home Range and Activity Areas

Home range has been defined as the area traversed by the animal during its normal activities of foraging, mating and caring for young (Burt 1943). Home range is typically assumed to be the area required by the animal for these activities throughout its lifetime. A common operation in determining home range consists of removing a small number of "outlier" locations, those visited once and far from the majority of locations used to establish the home range. Although an individual may occasionally make atypical and large movements to locations outside its home range, these outliers cannot be considered as "normal activities" in accurately determining home range (Calenge 2011). Other researchers have found that the inclusion of outliers can result in statistically unsupported home range measurements (Sweeten 2007). Thus, home range calculations used here refer to those data indicating normal activities as defined by Burt 1943, and do not include outlier location that can misrepresent an animal's home range. Another method commonly used to discuss home range would include a 95% use area, with the core use area as the 50% most often used portion of this area. Activity area is defined here as the current area of recorded use for the individuals that are being tracked in the Project area, but for which we may not yet have sufficient information to definitely determine a home range based on limited information studied to date. The actual home range of these individuals may be smaller (if outlier points were recorded) or larger (if not all home range has been sampled during this time period) than known at this time. Minimum convex polygons have been used to determine these areas in order to present a conservative estimate, although they are known to overestimate the true use areas (Harless et al 2009).

Table 4. Disease Results for Individual Tortoises in Project Area

Tortoise	Mycoplasma agassizii		Mycoplasma testudinium		Tortoise	Mycoplasma agassizii		Mycoplasma testudinium	
	Titer	Result	Titer	Result		Titer	Result	Titer	Result
SS1010	<32	Negative	<32	Negative	SS1046	<32	Negative	64	Positive
SS1011	<32	Negative	<32	Negative	SS1047	<32	Negative	<32	Negative
SS1012	<32	Negative	<32	Negative	SS1048	32	Suspect	64	Positive
SS1013	<32	Negative	64	Positive	SS1049	<32	Negative	<32	Negative
SS1014	<32	Negative	32	Suspect	SS1050	32	Suspect	32	Suspect
SS1015	<32	Negative	<32	Negative	SS1051	<32	Negative	32	Suspect
SS1016	<32	Negative	<32	Negative	SS1052	<32	Negative	<32	Negative
SS1017	<32	Negative	32	Suspect	SS1053	<32	Negative	<32	Negative
SS1018	<32	Negative	<32	Negative	SS1054	<32	Negative	<32	Negative
SS1019	<32	Negative	<32	Negative	SS1055	<32	Negative	<32	Negative
SS1020	<32	Negative	32	Suspect	SS1056	<32	Negative	<32	Negative
SS1021	<32	Negative	<32	Negative	SS1057	<32	Negative	32	Suspect
SS1022	<32	Negative	<32	Negative	SS1058	<32	Negative	<32	Negative
SS1022	<32	Negative	<32	Negative	SS1059	<32	Negative	<32	Negative
SS1023	<32	Negative	32	Suspect	SS1060	<32	Negative	<32	Negative
SS1024	<32	Negative	<32	Negative	SS1061	<32	Negative	32	Suspect
SS1026	<32	Negative	32	Suspect	SS1062	<32	Negative	<32	Negative
SS1027	<32	Negative	32	Suspect	SS1063	<32	Negative	<32	Negative
SS1028	<32	Negative	<32	Negative	SS1064	<32	Negative	32	Suspect
SS1029	<32	Negative	<32	Negative	SS1065	<32	Negative	32	Suspect
SS1030	<32	Negative	<32	Negative	SS1066	<32	Negative	<32	Negative
SS1031	<32	Negative	32	Suspect	SS1067	<32	Negative	<32	Negative
SS1032	<32	Negative	<32	Negative	SS1068	<32	Negative	64	Positive
SS1033	<32	Negative	<32	Negative	SS1069	<32	Negative	32	Suspect
SS1034	<32	Negative	<32	Negative	SS1070	<32	Negative	<32	Negative
SS1035	<32	Negative	<32	Negative	SS1071	<32	Negative	<32	Negative
SS1036	<32	Negative	64	Positive	SS1072	<32	Negative	128	Positive
SS1037	<32	Negative	<32	Negative	SS1073	<32	Negative	32	Suspect
SS1038	32	Suspect	<32	Negative	SS1074	<32	Negative	<32	Negative
SS1039	<32	Negative	<32	Negative	SS1075	<32	Negative	64	Positive
SS1040	<32	Negative	32	Suspect	SS1076	<32	Negative	<32	Negative
SS1041	<32	Negative	<32	Negative	SS1077	<32	Negative	32	Suspect
SS1042	<32	Negative	<32	Negative	SS1078	<32	Negative	<32	Negative
SS1043	<32	Negative	<32	Negative	SS1080	<32	Negative	<32	Negative
SS1044	<32	Negative	<32	Negative	SS1081	<32	Negative	32	Suspect
SS1045	<32	Negative	64	Positive					

The Service defines the home range for this species in several ways. The current Service guidance for surveys for this species (Service 2010a) states that "The annual home range for a female desert tortoise averages around 0.15 to 0.16 km2 (35 to 40 acres), about one third the size of male home ranges, which are variable and can be >2 km2 (500 acres; O'Conner et al. 1994; Duda et al. 1999; Harless et al. 2009)."

In the *1994 Desert Tortoise (Mojave Population) Recovery Plan*, it states that although estimated home range sizes of desert tortoises have been summarized recently (Berry 1986), most of these estimates are based upon very small sample sizes or questionable methods. By combining all available studies completed at that time, the recovery plan estimated the largest lifetime home range at 180 acres, with the average being 97 acres. These estimates are from a relocated population in the City Creek area of Utah in the northeastern part of the range of the species.

The *2011 Revised Recovery Plan for the Mojave Population of the Desert Tortoise* states that "The size of desert tortoise home ranges varies with respect to location and year (Berry 1986) and also serves as an indicator of resource availability and opportunity for reproduction and social interactions (O'Connor et al. 1994). Females have long-term home ranges that may be as little as or less than half that of the average male, which can range to 80 or more hectares (200 acres) (Burge 1977; Berry 1986; Duda et al. 1999; Harless et al. 2009). Over its lifetime, each desert tortoise may use more than 3.9 square kilometers (1.5 square miles) of habitat and may make periodic forays of more than 11 kilometers (7 miles) at a time (Berry 1986)."

The 2009 Harless paper referenced in the 2011 recovery plan looked at a large number of studies of desert tortoise home range and methods of defining home range, including the other studies referenced in the 2011 Recovery Plan (Table 5).

Table 5 Home Range from Sources in 1994 and 2011 Recovery Plans

Study	Home Range Areas (acres)	Maximum in Square Miles	Average in Square Miles
Burge 1977	27-94 (average 57)	>0.1	<0.1
Berry 1986	20-190 (for relocated animals)	0.3	NA
O'Conner et al 1994	15-114 (average 37)	0.2	<0.1
Duda et al 1999	0-109 (no average reported)	0.2	NA

This BA also looked at all available sources that attempt to define desert tortoise home range. A summary of the results are shown in Table 6. Most of these data include 100% of known location points and so provide a conservatively high estimate of home range for this species.

Table 6 Home Range from All Published and Gathered Data

In Acres (Sq Miles)	Highest Maximum Home Range	Average Maximum Home Range	Highest Mean Home Range	Average Mean Home Range
Males	253 (0.4)	106 (0.2)	131 (0.2)	63 (0.1)
Females	272 (0.4)	55 (<0.1)	52 (<0.1)	29 (<0.1)

In addition to these results, unpublished data provided by Dr. Ken Nussear of the USGS in Las Vegas from his long-term study for a site known as Bird Springs was used. This dataset not only provides the longest term study available for this species (3 years of data with over 100 locations points for 22 animals), but it is the closest prior research effort in proximity to the Project site. Table 7 summarizes home range information from this dataset, which Dr. Nussear agrees represents an appropriate proxy for home range information at the Project site (Nussear 2011). These data also include 100% of known location points to provide a conservatively high estimate of home range for this species.

Table 7 Home Range from Bird Springs

In Acres (Square Miles)	Maximum Home Range	Mean Home Range
Males	253 (0.4)	64 (0.14)
Females	272 (0.4)	41(<0.1)

Table 8 shows the size of the activity areas to date for the animals in the immediate area of the Project site, also using 100% of known locations from September 1, 2012 to February 1, 2013.

Table 8 Activity Area from Project

In Acres (Square Miles)	Maximum Home Range	Average Home Range
Males	169 (0.3)	82 (0.1)
Females	50 (0.1)	13 (<0.1)

As shown in the tables above, the Bird Springs data is the dataset with the largest maximum home ranges for both males and females. This data set could therefore serve as a conservative estimate of maximum home range for the tortoise at the Project site which shows a similar pattern of home range size emerging from data collected to date.

6.5 Connectivity

This section discusses the existing conditions of both genetic and demographic connectivity in the Project region. Genetic connectivity is distinguished from demographic connectivity in peer reviewed scientific literature discussing connectivity (Lowe et al 2010). Connectivity as discussed for the Project includes the concepts of both ecological (or genetic connectivity) and habitat/landscape connectivity (or demographic connectivity) as academically defined (Lindenmayer and Fischer 2006). The potential for both genetic and demographic connectivity throughout the Ivanpah Valley and surrounding areas is discussed in further detail in the *Desert Tortoise Connectivity Assessment within the Ivanpah Valley* (Appendix E).

Genetic Connectivity

Ecological connectivity is the connectedness of ecological processes across multiple scales (Lindenmayer and Fischer 2006). Genetic connectivity is one aspect of ecological connectivity and is defined as the degree to which gene flow affects evolutionary processes within populations (Lowe et al 2010). Recent studies (Hagerty 2008, 2010, 2011) suggested a genetic relationship between the desert tortoise population in the Ivanpah Critical Habitat Unit (CHU) south of the Project, and the El Dorado portion of the Piute-El Dorado CHU to the east of the Project. The baseline conditions of genetic connectivity in the region of the Project were the subject of an extensive study the Applicant began in 2011 in coordination

with the USGS in Las Vegas. This study determined that the McCullough Pass region in the northern McCullough Mountains is likely the only remaining potential genetic connectivity linkage between those two populations (Figure 3). The habitat areas defined within the McCullough Pass include slopes up to 30% because using a more conservative definition of slopes up to 20% slope would have excluded this pass from habitat entirely, and as shown in Figure 3, a number of tortoises are now known to inhabit this area. This path also crosses though the area east of the Project between the eastern Project boundary and the Lucy Grey Mountains (Figure 4).

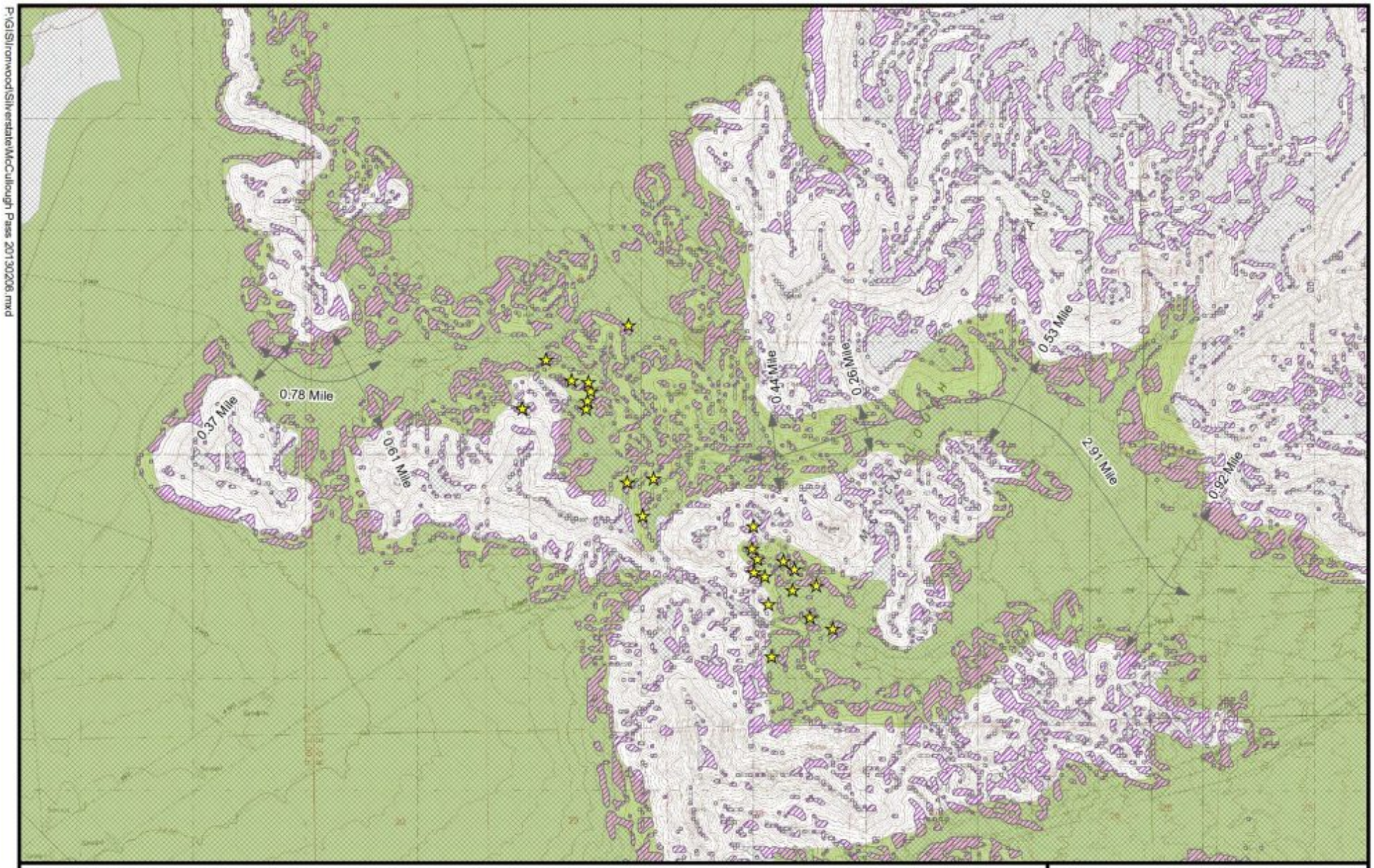
A greater degree of genetic connectivity appears to have been possible historically over the northern end of the McCullough Mountains through the Las Vegas Valley prior to the development of that area, which has now severed any potential connectivity through that area.

Demographic Connectivity

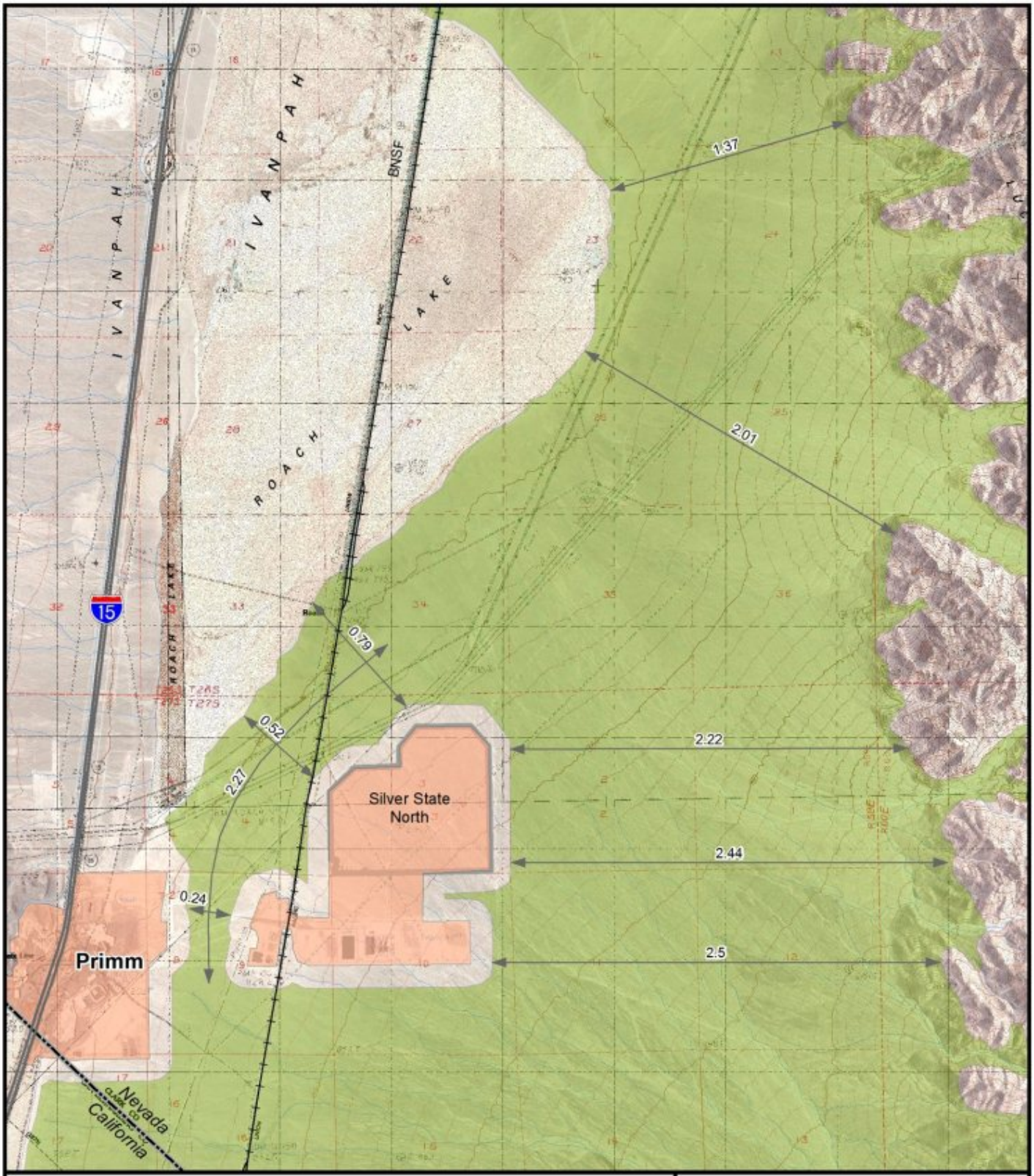
Habitat and landscape connectivity (demographic connectivity) describe a pattern of habitat or vegetation that is connected (Lindenmayer and Fischer 2006). Demographic connectivity also refers to the degree to which population growth and vital rates are affected by dispersal (Lowe et al 2010). This concept is distinct from genetic connectivity as it refers to a more geographic concept of how habitat, vegetation, and dispersal (immigration and emigration) affect survival of a species through birth and growth rates. Thus, demographic connectivity assumes the potential for immigration or emigration at a greater frequency than that of genetic connectivity, which requires only genetic exchange on a generational basis. Demographic connectivity would assume a greater geographic connectedness of habitat and vegetation than genetic connectivity.

The baseline conditions of demographic connectivity in the Project region have been restricted from their historic condition by human developments in the region that act as biological barriers. Human developments that have provided the greatest restriction in the Project region include linear features such as I-15 and related fencing, and the Union Pacific Railroad; and larger developments such as the communities and commercial developments in Primm and Jean (Figure 5 – habitat defined as 20% slope). These restrictions have limited the potential for demographic connectivity in the area of the Project to a narrower “dead end” habitat area that extends north of the Project to just south of Jean, and northeast of the Project into Hidden Valley.

Figure 6 shows the areas likely to support significant populations of desert tortoise that could provide the potential for immigration or emigration necessary to support demographic connectivity into the Ivanpah CHU. Figure 6 uses the habitat line defined as 20% slope combined with the 30% slope line in the McCullough pass area and also shows those areas within the Project region that are less than 1.4 miles in width under existing conditions. Existing demographic connectivity between the Ivanpah CHU and El Dorado portion of the Piute-El Dorado CHU is unlikely because no significant swaths of habitat or vegetation connectivity remain between these areas that could support a high frequency of immigration or emigration required for demographic connectivity, although the McCullogh Pass area likely supports a level of connectedness to support genetic connectivity between these areas.


P:\GIS\Ironwood\Silverstate\McCullough Pass 20130206.mxd
0.37 Mile
0.78 Mile
0.61 Mile
0.44 Mile
0.26 Mile
0.53 Mile
2.91 Mile
0.92 Mile
Tortoise Location
Desert Tortoise Habitat-
McCullough Pass Corridor
Slope <20%
Slope <30%
N
0
1
Miles
SILVER STATE SOLAR SOUTH
Figure 3
McCullough Pass

P:\GIS\Ironwood\Silverstate\Roach_Lake_Corr.mxd



Distance in Miles

Desert Tortoise Habitat

Developed/Disturbed Area

Silver State North

N

0 500 1,000 Meters

SILVER STATE SOLAR PROJECT

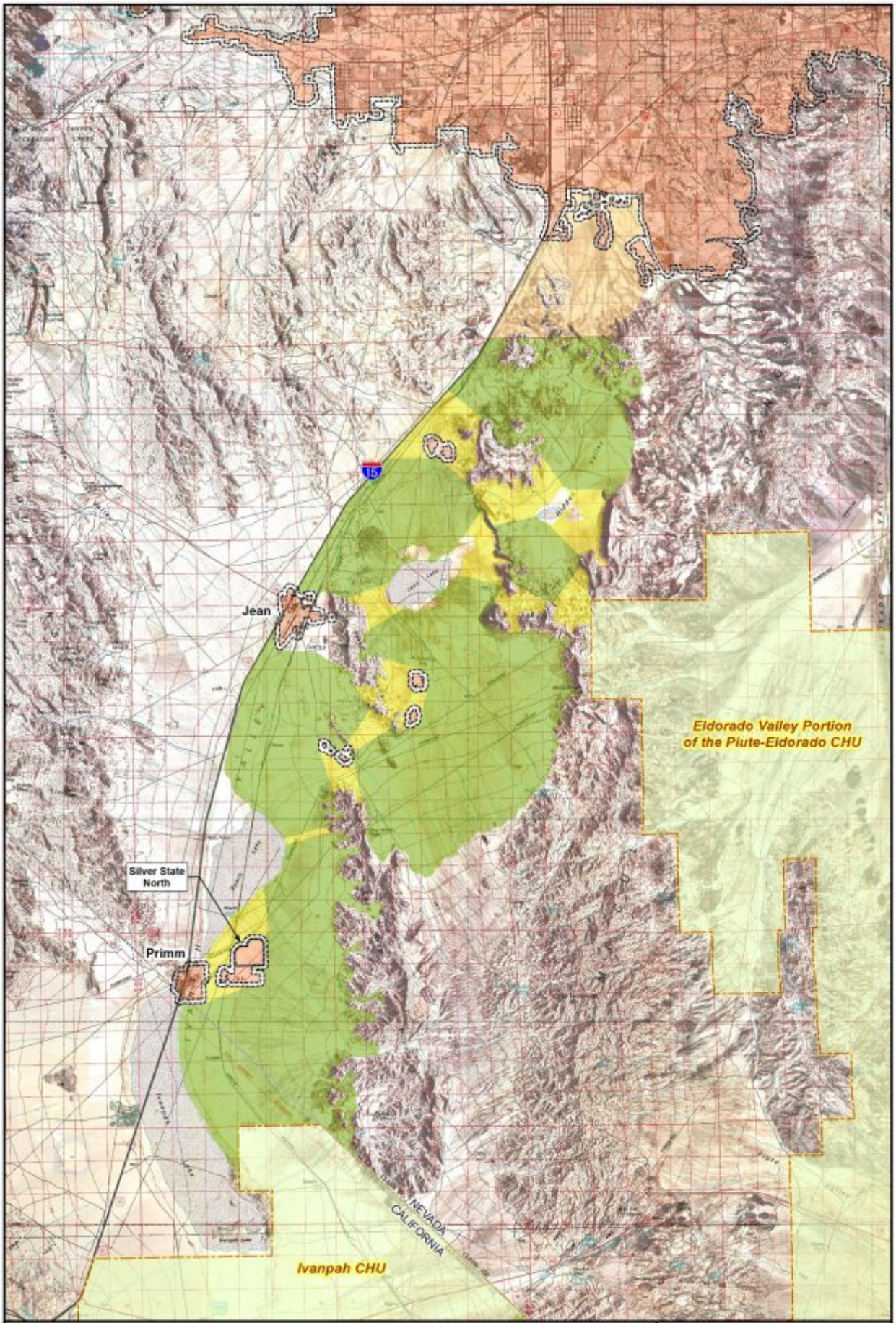
Figure 4

Roach Lake Corridor

SILVER STATE SOLAR SOUTH

Figure 5

Existing Barriers to Tortoise Movement

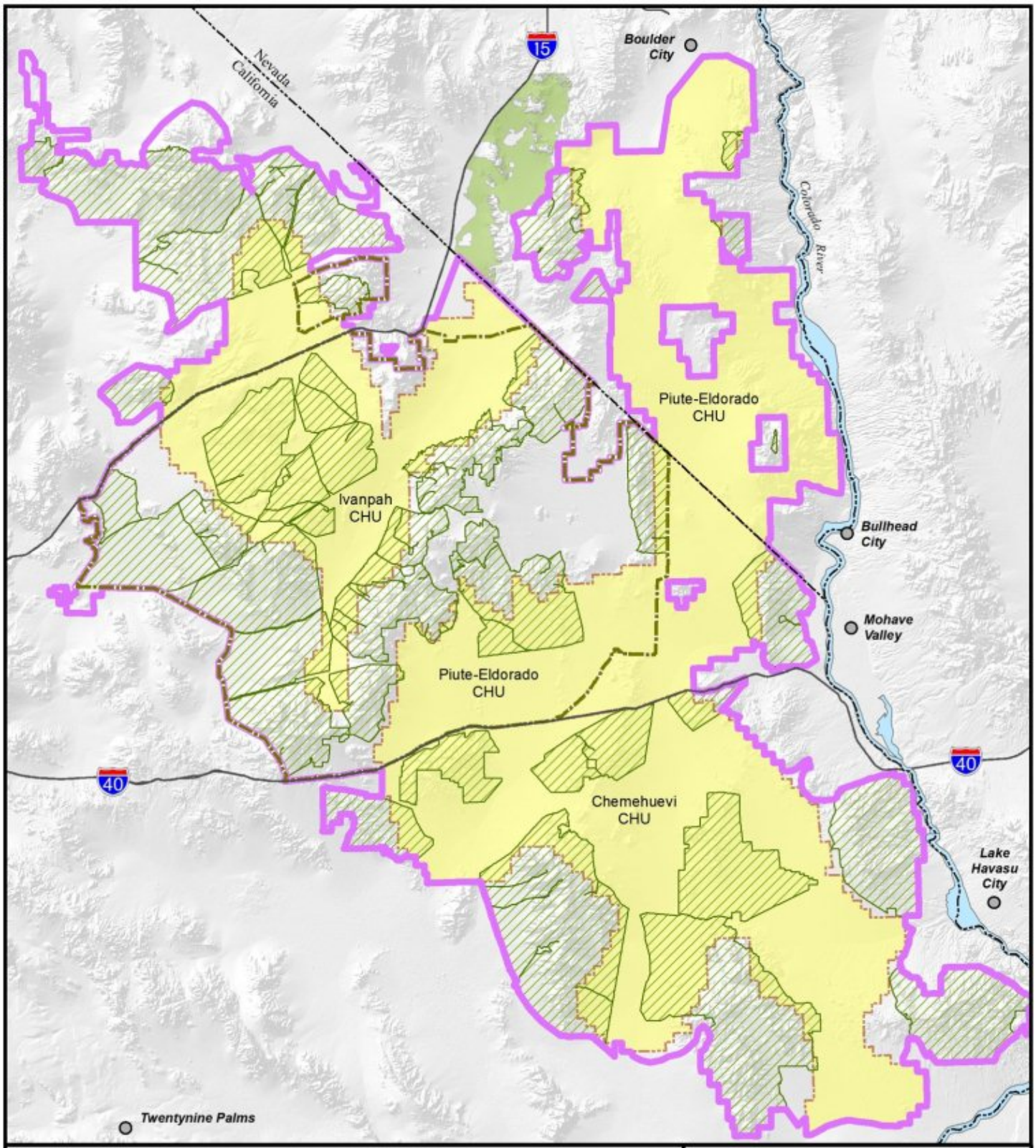


SILVER STATE SOLAR SOUTH

Figure 6

Existing Desert Tortoise Habitat

However, existing large swaths of both habitat and vegetation connectivity do remain between these two CHUs, and between additional conserved areas in the region, thus protecting demographic connectivity of these populations in the future. Preserving demographic connectivity depends, in part, on the concept of reserve design and maintaining a large and continuous area of conserved habitat (Service 2012); thus preserving habitat and vegetation connectivity. Figure 7 shows the existing conditions of the conservation areas in the Project region, a contiguous area of over 4 million acres, of which approximately 75% is modeled as good habitat for the Mojave desert tortoise (Nussear 2009). These areas appear to have been well planned throughout the process of developing the 1994 and 2011 Recovery Plans to provide for habitat and densities at a very large scale to protect both genetic and demographic connectivity for this species in the region.



Desert Tortoise Habitat

Desert Tortoise Critical Habitat Unit (CHU)

Meta-Reserve Boundary

Wilderness Area

Mojave National Preserve

N

0 5 10 15 Miles

SILVER STATE SOLAR SOUTH

Figure 7

Regional Conservation Areas

7.0 Effects of the Proposed Action

The effects discussion and analysis from the 2010 BA and BO has not changed substantially with the following exceptions discussed here:

1. Direct effects to estimated tortoise numbers based on the revised Proposed Action and updated surveys; and
2. Indirect effects to disease status, home range and activity areas, and connectivity based on further data and studies.
3. Proposed Mitigation to offset potentially-adverse indirect effects.

7.1 Direct Effects

Revised tortoise estimates are available as a result of full coverage surveys of the supplemented Project location and nearby areas that were not surveyed for the 2010 BA (Table 9 and Figure 8).

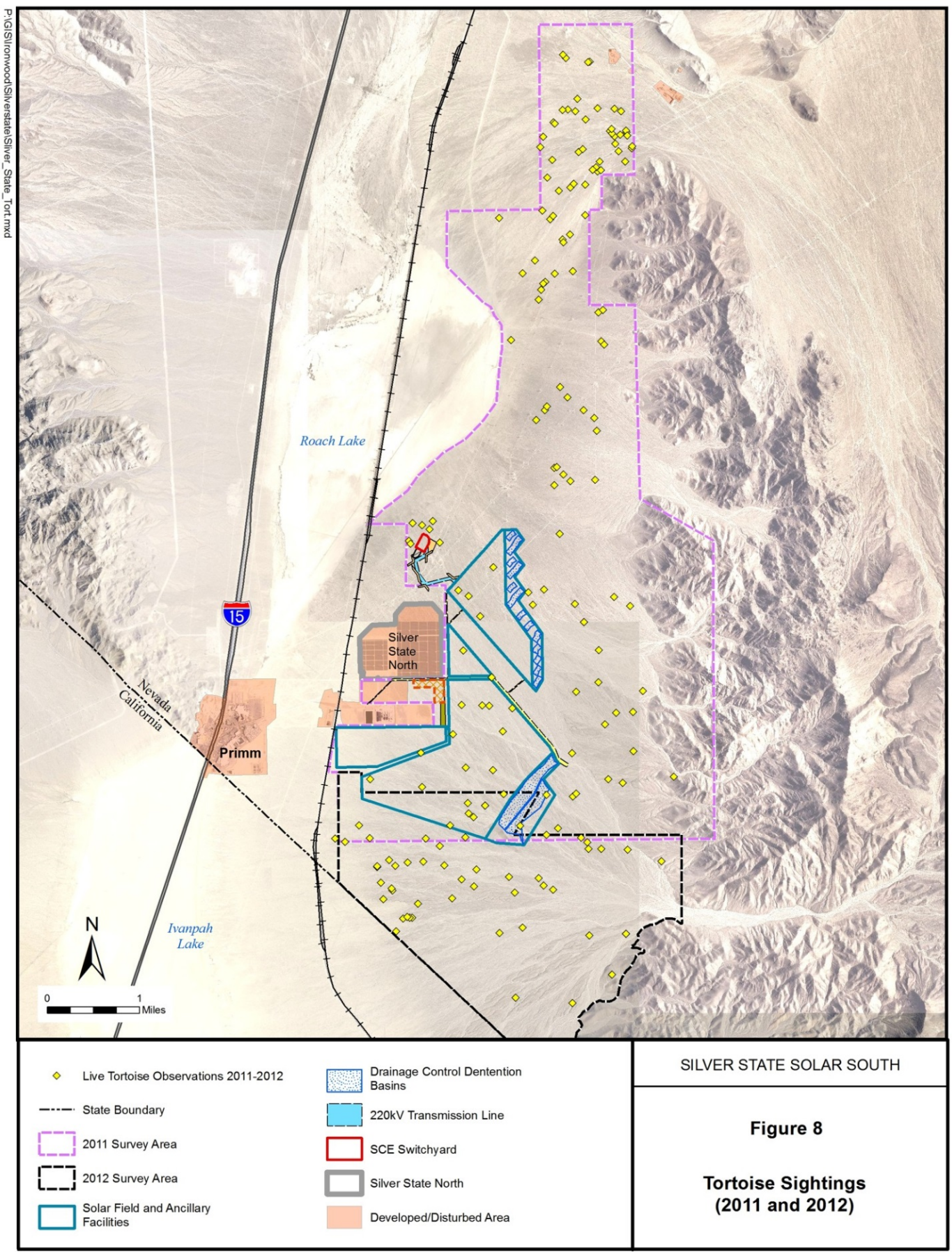
Table 9 Project Progression for Estimated Numbers of Tortoises

Project Phase and Size (acres)	Point Estimate (# tortoises)	95% Confidence Interval (# tortoises)	Comments
2010 BA (2,966)[1]	88	42 to 123	Estimates in 2012 BA included Silver State North where 14 animals were estimated as a point count and 7 were found during clearance. The remaining 74 estimated were from sampling surveys of the Proposed Action in the 2010 FEIS.
February 2013 BA Phase II (2,949)	47	17 to 125	Estimates for Phase II are based on 2011 and 2012 full coverage surveys with added confidence of having many animals transmittered since Fall 2012.
February 2013 BA Phase II and III combined (3,913)	104	45 to 244	
June 2013 BA Phase II (2,427)	**44**	**17 to 115**	

Confidence in these estimates is high based on the following factors:

1. These results are based on full coverage surveys by experienced desert tortoise surveyors;
2. These surveys were conducted in a season with above average rainfall (Spring and Fall 2011, Fall 2012);
3. The number of animals that currently have transmitters and whose activity areas are known to overlap with Phase II of the Project is 43, similar to the 44 estimated.

[1] The 2010 BA and BO addressed the originally proposed 400 MW Silver State Project – i.e., Phases I, II and III. As noted above, the BLM issued a ROD in 2010 approving the development of Phase I and that project (Silver State North) is now complete. During construction, 7 desert tortoises were located on the Phase I project site and successfully relocated or moved to the Desert Tortoise Conservation Center per the Project's approved translocation plan. The 3 desert tortoises relocated in conjunction with Phase I were at the low end of the 95% confidence interval for Phase I where 14 individuals were estimated.


P:\GIS\Ironwood\Silverstate\Silver_State_Tort.mxd
Roach Lake
15
Silver State North
Nevada
California
Primm
Ivanpah Lake
N
0
1
Miles
Live Tortoise Observations 2011-2012
State Boundary
2011 Survey Area
2012 Survey Area
Solar Field and Ancillary Facilities
Drainage Control Dentention Basins
220kV Transmission Line
SCE Switchyard
Silver State North
Developed/Disturbed Area
SILVER STATE SOLAR SOUTH
Figure 8
Tortoise Sightings (2011 and 2012)

7.2 Indirect Effects

Indirect effects discussed in this section relate to the change from existing conditions discussed in Section 6 of this document.

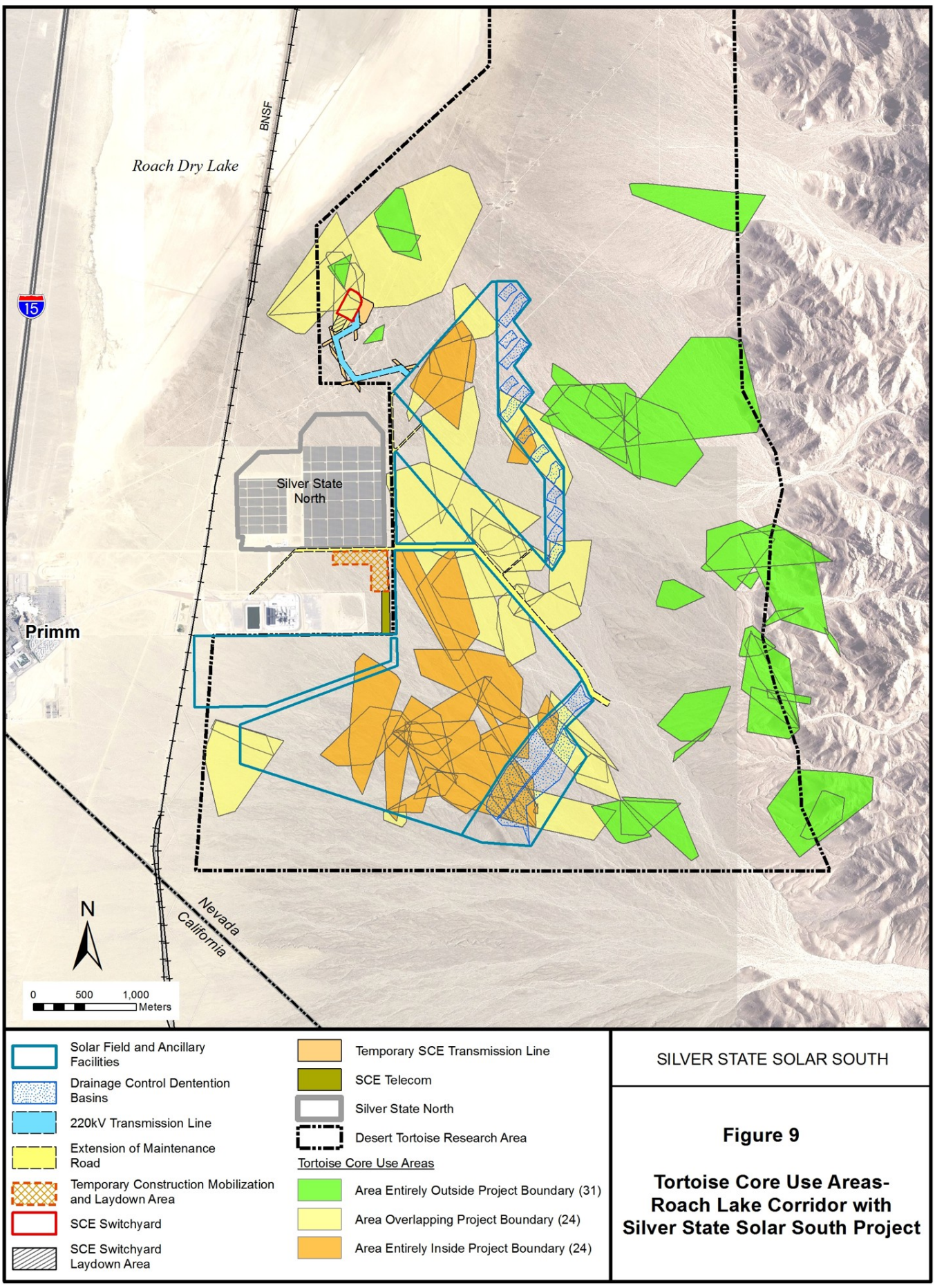
7.2.1 Disease Status

Current disease status of individuals located within the Project site and in immediately surrounding areas is shown on Table 4. Anecdotal evidence suggests that translocation stress may affect disease rates within a population, as discussed in the 2010 BA. However, recent information from the Fort Irwin translocation project indicates that translocations in that study did not cause a measurable physiological stress response (Averill-Murray 2011). Information from any translocation associated with this project, and other recent large scale translocation efforts would help inform this question.

7.2.2 Home Range and Activity Areas

The Project would alter the home range and activity area of all tortoises translocated from the Project site, and of others whose home ranges overlap the Project. Because there is and will continue to be significantly more home range information available for these individuals prior to translocation than has been available in past translocations (see discussion in Section 6.0), many more animals will be able to be translocated into areas known to be within their home range which provides significant benefits in terms of reducing potential adverse effects associated with translocation.

Figure 9 shows the information to date for the home range of the individuals on and adjacent to the Project site. Those tortoises indicated in orange have their known home range entirely within the Project site and those in green entirely outside of the Project site. Those in yellow have home ranges that overlap the Project boundary. Translocation under the Project's *Desert Tortoise Translocation Plan for Silver State Solar South* (Appendix A) would propose to keep all animals with home ranges that overlap undisturbed areas (those in yellow) within their known home range.


P:\GIS\Ironwood\Silverstate\CoreUse_20130621.mxd
Roach Dry Lake
BNSF
15
Silver State North
Primm
Nevada
California
N
0 500 1,000
Meters
Solar Field and Ancillary Facilities
Drainage Control Dentention Basins
220kV Transmission Line
Extension of Maintenance Road
Temporary Construction Mobilization and Laydown Area
SCE Switchyard
SCE Switchyard Laydown Area
Temporary SCE Transmission Line
SCE Telecom
Silver State North
Desert Tortoise Research Area
Tortoise Core Use Areas
Area Entirely Outside Project Boundary (31)
Area Overlapping Project Boundary (24)
Area Entirely Inside Project Boundary (24)
SILVER STATE SOLAR SOUTH
Figure 9
Tortoise Core Use Areas-
Roach Lake Corridor with
Silver State Solar South Project

7.2.3 Connectivity

Genetic Connectivity

The Project would not likely adversely affect local or regional genetic connectivity. The corridor remaining with the addition of the Project is substantially larger than other naturally-occurring corridors that support genetic connectivity in the region, such as the McCullough Pass, and is approximately the same average width and shorter in length when compared to the corridor evaluated and approved by the Service in the 2010 BO in connection with the previously proposed Phases II and III of the original 400 MW Silver State Solar Project (Table 10 and Figure 10). Table 10 also provides the details of lengths and widths of the McCullough Pass corridor for comparison purposes.

Average width was calculated by taking widths every 50 meters throughout the length of the corridor and averaging those widths. An additional comparison was made to calculate the approximate area of the entire corridor adjacent to the project to ensure it was similar to the length (3.5 miles) times the average width (1.5), which equals approximately 3,360 acres. The area of the actual corridor as mapped on Figure 10 is approximately 3,336 acres and does not include additional habitat between the blocks of solar arrays, or the areas that would be left as movement area within the drainage basins.

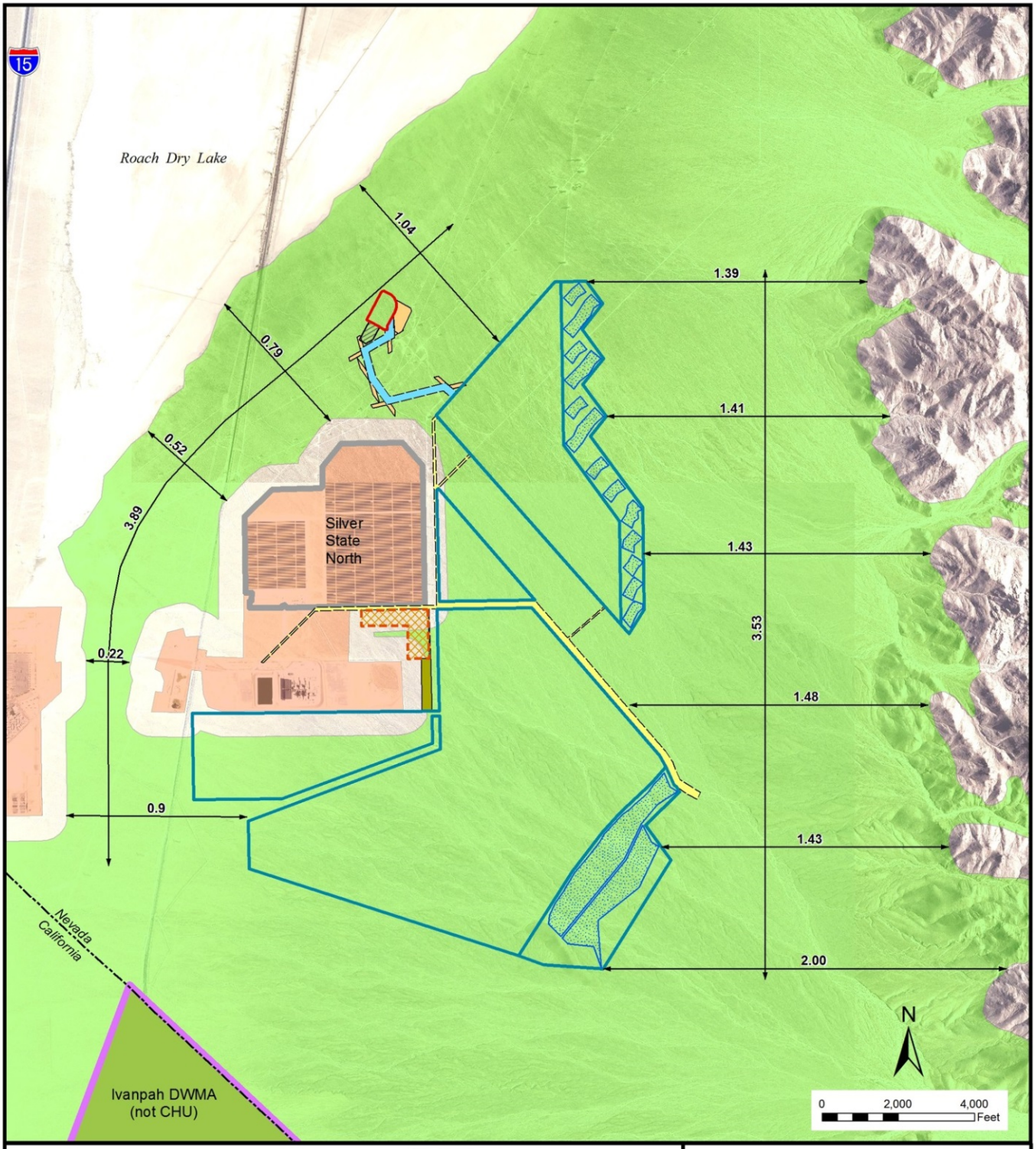
Table 10 Corridor Widths and Lengths

Alternative	Length (miles)	Average Width (miles)	Minimum Width (miles)
Alternative C (approved in 2010 BO)	4.4	1.7	1.2
Project in this BA	3.5	1.5	1.3
McCullough Pass	3.7	0.5	0.3

Proposed mitigation (Section 4.2) could beneficially affect regional genetic connectivity by removing barriers under I-15 between the LSTS and the eastern side of the freeway, thus opening up a minimum of 26,200 additional acres in the region to genetic connectivity. Figure 10 shows the additional areas of genetic connectivity that would also connect larger reserve areas in the region of the Project.

Demographic Connectivity

The Project may affect demographic connectivity within the immediate Project area through increased habitat fragmentation. Very little research currently exists regarding connectivity in relation to the desert tortoise (Service 2012), and in particular, there are no scientifically established metrics for determining adverse impacts to connectivity (i.e., the necessary width of a corridor to allow demographic connectivity). To adversely affect demographic connectivity, the Project would need to change the rate of dispersal to a degree at which population growth and vital rates decrease in the regional population as a whole. Because little is known about normal rates of dispersal, population growth rates, or vital rates for this species, it is impossible to precisely assess these effects or to make a determination regarding an adverse effect at a geographic or landscape level.

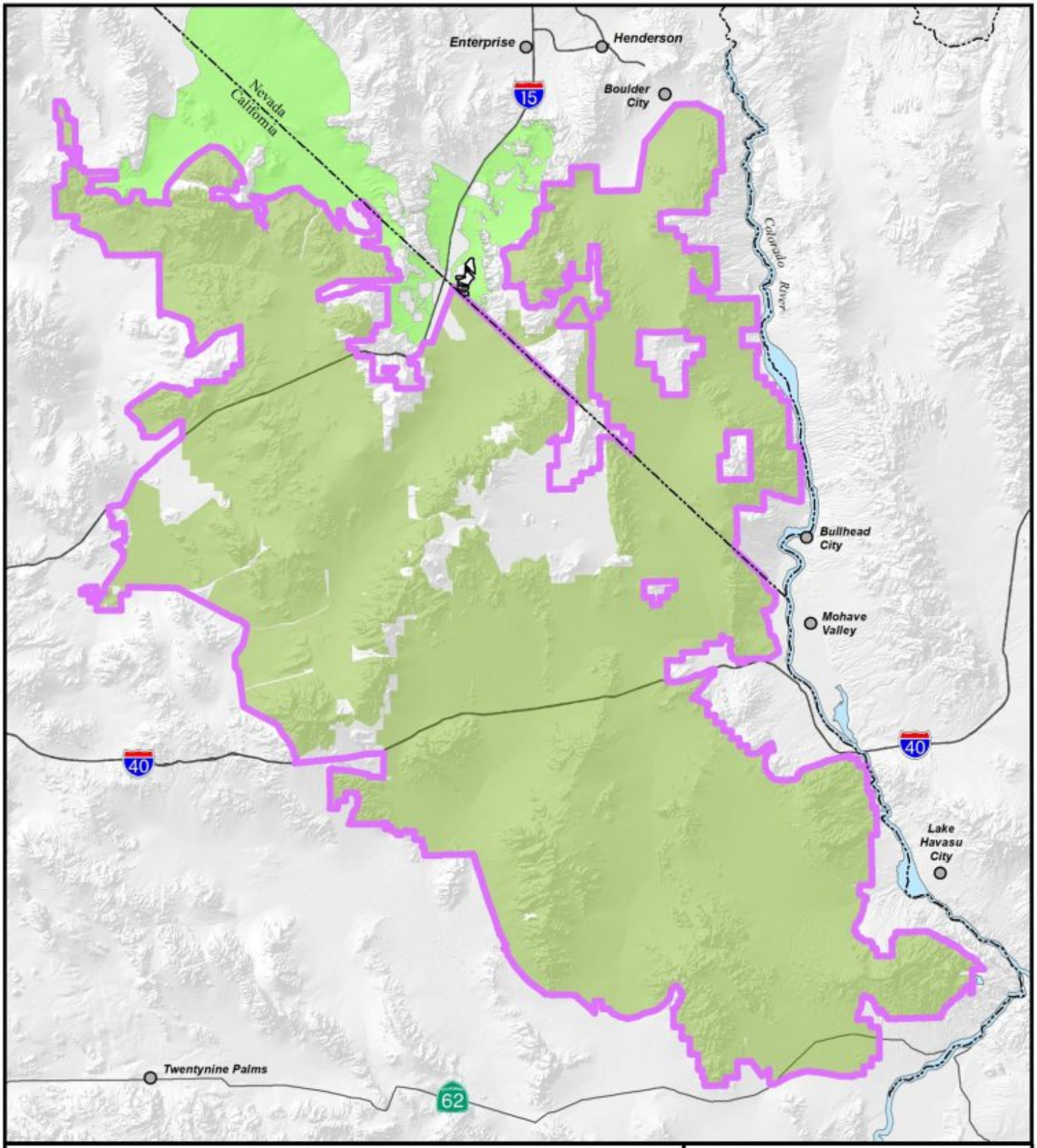

P:\GIS\Ironwood\Silverstate\R_Lake_Corridor_20130621.mxd
15
Roach Dry Lake
1.04
0.79
0.52
3.89
0.22
0.9
1.39
1.41
1.43
3.53
1.48
1.43
2.00
Silver State North
Nevada
California
Ivanpah DWMA (not CHU)
N
0
2,000
4,000
Feet
Corridor Width in Miles
Solar Field and Ancillary Facilities
Drainage Control Dentention Basins
220kV Transmission Line
Extension of Maintenance Road
Temporary Construction Mobilization and Laydown Area
SCE Switchyard
SCE Switchyard Laydown Area
Temporary SCE Transmission Line
SCE Telecom
Desert Tortoise Habitat
Meta-Reserve Boundary
Meta Reserve
Developed/Disturbed Area
SILVER STATE SOLAR SOUTH
Figure 10
Habitat Areas With Project Implementation

Reserve design suggests that large contiguous areas are needed to best preserve population viability and the same factors important in demographic connectivity (Service 2012). The areas of potential habitat north of the Project site represent a narrow band of habitat already fragmented. This area is unlikely to contribute significantly to regional reserve design or regional demographic connectivity as is represents a narrow finger of habitat compared to the larger block of contiguous conservations areas that are protected south and east of the Project.

Figure 11 shows the areas that would be protected with the implementation of the Project, and the additional areas of genetic connectivity that would connect these larger reserve areas. With the Project site developed, there would still remain over 4 million acres of contiguous protected habitat near the Project, 75% of which is modeled as habitat for desert tortoise. Moreover, in conjunction with the Project, BLM has also proposed greater than 40,000 acres of BLM lands to be designated as an ACEC including those lands east of the project boundary and the foothills of the Lucy Gray Mountains which includes management actions focused on conserving desert tortoise habitat (BLM 2012), thereby further enhancing the quality of existing habitat area.

7.3 Cumulative Effects

Cumulative effects are similar to those discussed in the 2010 BA because no additional projects have been proposed since the completion of the 2010 BA and BO that would change this analysis.


P:\GIS\Ironwood\Silverstate\Region_Habitat 2.mxd
Enterprise
Henderson
Boulder City
15
Nevada
California
Colorado River
Bullhead City
Mohave Valley
40
40
Lake Havasu City
Twentynine Palms
62
Proposed Silver State South Project Location
Meta-Reserve Boundary
Meta Reserve
Desert Tortoise Habitat Outside of Protected Area
N
0 5 10 15
Miles
SILVER STATE SOLAR SOUTH
Figure 11
Regional Habitat

8.0 Conclusion

The BLM concludes that the Silver State South Solar Project may affect, and is likely to adversely affect, the Mojave population of the desert tortoise despite the incorporation of conservation measures, and mitigation measures designed to avoid, minimize and mitigate for adverse effects to this species. With the minimization measures and compensatory mitigation listed in Section 4.0, adverse effects to the desert tortoise would be avoided and minimized.

The project may translocate as many as 115 adult desert tortoises, and potentially affect additional individuals that are handled as part of the Project minimization measures and compensatory mitigation.

The BLM concludes that the Project is not likely to destroy or adversely modify critical habitat for desert tortoise because the Proposed Action does not occur within or adjacent to designated critical habitat or directly or indirectly affect the primary constituent elements of critical habitat for the desert tortoise.

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